3522A - HTA13P - 4527A - HTA16P - 5533A - HTA19P



# Maintenance Book

# 3522A - HTA13P - 4527A - HTA16P - 5533A - HTA19P

4001010720 E 04.19 USA / GB

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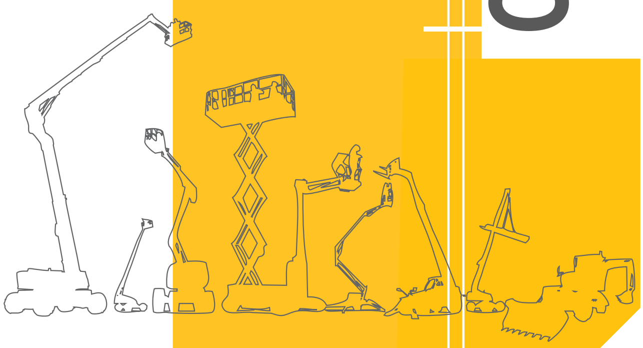
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# A-Preface - Foreword

You have just purchased a HAULOTTE® product and we would like to thank you for your business.

The Aerial Work Platform is a mechanical device primarily designed and manufactured with the intent to position people with the necessary tools and material to overhead elevated temporary workplaces. All other uses or alterations/modifications to the aerial work platform must be approved by HAULOTTE®.

This manual shall be considered a permanent component of the machine and shall be kept with the aerial work platform in the designated Manual Holder, at all times.

Safe operation of this product can only be assured if you follow the operating instructions contained in this manual are followed. To ensure proper and safe use of this equipment, it is strongly recommended that only trained and authorized personnel operate and maintain the aerial work platform.

We would particularly like to draw your attention to 2 essential points :

- Compliance with safety instruction (machine, use, environment).
- Use of the equipment within the performance limits.

With regard to the designation of our equipment, we stress that this is purely for commercial purposes and not to be confused with the technical specifications. Only the specifications in this manual should be used to study the suitability of the equipment for the intended use.

This maintenance and repairs book is specific to the HAULOTTE® products listed on the cover page of this manual. The maintenance book is intended for the on-site maintenance technician.

It is the on-site maintenance technician's duty to carry out the regular maintenance work recommended by HAULOTTE Services®.

This maintenance work is essential for correct machine operation.

If regular maintenance is not carried out, this may :

- Void the warranty.
- Cause machine malfunction.
- Reduce machine reliability and shorten its service life.
- Jeopardize operator safety.

**To ensure that the regular maintenance requirements are fully satisfied, contact HAULOTTE Services®.**

**HAULOTTE Services® technicians are specially trained to carry out extensive repairs, interventions or adjustments on the safety systems or elements of HAULOTTE® machines. They carry genuine HAULOTTE spare parts and tools as required, and also provide fully documented reports on all work completed.**

# A-Preface - Foreword

## 1 - Symbols and colors

Symbols and colors are used to alert the operator of safety precautions and/or to highlight important safety information.

The following safety symbols are used throughout this manual to indicate specific hazards and the hazard severity level when operating or maintaining the Aerial Work Platform.

**Symbol**

| Symbol | Description |
|---|---|
|  | Danger : Risk of injury or death |
|  | Caution : Risk of material damage |
|  | Prohibition relating to work safety and quality |
|  | Reminder to use good practice or follow pre-operation checks |
|  | Cross-reference to another part of the manual |
|  | Cross-reference to another manual |
|  | Cross-reference to repair (contact HAULOTTE Services®) |
|  | Maintenance sheet |
|  | Recommended tools |
|  | Recommended part |
|  | Safety |
| N.B. : | Additional technical information |

## Decals

| Color | Title | Description |
|---|---|---|
| | DANGER | Danger : Indicates a hazardous situation which if not avoided, WILL result in death or serious injury. |
| | WARNING | Warning : Indicates a hazardous situation which if not avoided, COULD result in death or serious injury. |
| | CAUTION | Caution : Failure to comply could result in minor or moderate injury. |
| | NOTICE | Notice : Indicates practices not related to personal injury. |
| | PROCEDURE | Procedure : Indicates a maintenance operation. |

*N.B.-:-THE FOLLOWING SAFETY ADVISORIES ARE USED THROUGHOUT THIS MANUAL TO INDICATE SPECIFIC HAZARDS WHEN OPERATING OR MAINTAINING THE TELEHANDLER.*

# Notes

# 1 - General safety rules

## 1.1 - Maintenance implementation

Your safety and the safety of the people around are essential.

Make sure the work area is clean in order to not to pollute the system of the machine.

Before performing any maintenance interventions, place the machine in maintenance configuration.

1. Position the machine on a flat ground, stabilized and in a released environment.
2. Stow the machine completely.
3. Push the E-stop button to cut off the electricity supply.

Never leave the hydraulic cylinders fully extended before switching off the machine, or when stationary for an extended period of time. Keep the elements of the machine in configuration of maintenance thanks to mechanics devices.

Report that the machine is under maintenance by tagging the platform and ground control boxes.

Note :
- Using the machine during maintenance is strictly forbidden.
- Do not climb onto the covers.
- The handling of parts must be carried out using appropriate equipment (Chains, Lifting slings, Lifting anchors).
- Plug the end of any hoses removed, and cap any open ports to prevent contamination during maintenance.

Return the machine to operating configuration after maintenance has been completed :

1. Pull the E-stop button.

### 1.2 - Uncontrolled movement Hazard

Be aware of uncontrolled movement and always respect the following :

- Maintain clearance from high voltage lines.
- Maintain clearance from generators, radar, electromagnetic fields.
- Never expose the batteries or electrical components to water (high pressure washer, rain).
- Never tow the machine over extended distances.
- In case of a machine breakdown, it is possible to tow short distance to load it onto a trailer.
- Never leave the hydraulic cylinders fully extended before switching off the machine, or when stationary for an extended period of time.
- Retract and lower the boom to the stowed position rotate the turntable so that the boom is between the non-steering wheels.
- Select a safe parking location, on a firm level surface, clear of obstruction and traffic.
- Ensure all compartments are closed and secured.
- Chock the wheels.

## 1.3 - Electrocution Hazards

The machine is not electrically insulated and does not provide protection from contact or proximity to electrically charged conductors.

Always position the lift at a safe distance from electrically charged conductors to ensure that no part of the machine is within an unsafe area.

Respect the local rules and the minimum safety distance from power lines.

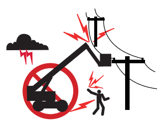
**Minimum safe approach distances**

| Electric voltage | Minimum safety distance | |
|---|---|---|
| | Mètre | Feet |
| 0 - 300 V | Avoid contact | |
| 300 V - 50 kV | 3 | 10 |
| 50 - 200 kV | 5 | 15 |
| 200 - 350 kV | 6 | 20 |
| 350 - 500 kV | 8 | 25 |
| 500 - 750 kV | 11 | 35 |
| 750 - 1000 kV | 14 | 45 |

***N.B.-:-This table is applicable, except when the local regulations are more strict.***

Do not operate the machine :

- Do not operate the machine when close to live power lines, consider the movement of the machine and the sway of the electric power lines particularly in windy conditions.
- Do not operate the machine during lightning, thunderstorms, snow/ice or any weather condition that could compromise operator safety.



- Do not operate the machine during lightning or storms.
- Do not use the machine as a welding earth.



- Do not wash electrical components with a high pressure washer.



- Do not weld on the machine without first disconnecting the battery terminals.



- The machine must not be used while charging the batteries.
- When using the platform AC power line, ensure it is protected with a circuit breaker.

Keep away from the machine if it contacts energized power lines. Personnel on the ground or in the platform must not touch or operate the machine until energized power lines are shut off.

In the event of accidental contact with a high voltage line, wait for the power to the line be de-energized before attempting to operate the machine.

## 1.4 - Explosion / Fire Hazards

Always wear protective clothing and eye wear when working with batteries and power sources/systems.

***N.B.-:-Acid is neutralized with sodium bicarbonate and water.***

- Do not work in an explosive or flammable atmosphere / environment.
- Do not touch hot components.
- Do not bridge the battery terminals with metallic objects.
- Do not service the battery in proximity of spark, open flame, lit cigarettes.



# 2 - Maintenance and repair training

## 2.1 - OWNER'S RESPONSABILITY

The owner (or hirer) has the obligation to inform technician of the instructions contained in the Operator Manual and Maintenance Book.

The owner (or hirer) has the obligation to renew all manuals or decals that are either missing or in bad condition.

Additional copies can be ordered from HAULOTTE Services®.

The owner (or hirer) is responsible for applying the local regulations regarding maintenance of the machine.

## 2.2 - TECHNICIAN'S RESPONSABILITY

The technician must read and understand the contents of this manual, operators manuals and the decals affixed on the machine.

The technician must inform the owner (or hirer) if the manual or any decals are missing or in poor condition, and of any malfunction of the machine.

**Only authorized and qualified operators may operate HAULOTTE® machines.**

## 2.3 - HAULOTTE SERVICES®

The HAULOTTE® is at your service in all 5 continents of the world via an extensive network of its own factory trained technicians, who are ready to respond to your every need.

## 2.4 - TRAINING

Whether you want to just service your equipment or carry out a complete overhaul, HAULOTTE® can provide you with a structured training program or we can tailor a program to suit your specific requirements or circumstances. Training can cover the general operation of the equipment, breakdowns, engine maintenance and repairs and electrical/hydraulic/mechanical repairs and trouble shooting.

## 2.5 - Product modification

In a constant effort to improve the quality of machines, HAULOTTE continually monitors technical improvements that enable to develop products with improved safety and greater reliability. The target being that HAULOTTE® always work to build confidence in the relationships with our customers.

These improvements will be shared via the following documents :
- OI : Obligatory Intervention, Safety information requiring immediate action (take into account by HAULOTTE®).
- NI : Technical improvement requiring immediate action (take into account by HAULOTTE®).
- RI : Improvement proposed to customers to take into account during maintenance operation.
- PI : Product information for knowledge.

## 2.6 - After Sales Service

Our HAULOTTE Services® After Sales Service is at your disposal throughout your machine's service life to ensure the optimum use of your HAULOTTE product :
- When contacting our After Sales Service, ensure that you provide the machine model and serial number.
- When ordering any consumables or spare parts, please use this manual and the HAULOTTE® Essential catalogue to receive your genuine HAULOTTE® spare parts, your only guarantee of parts interchangeability and correct machine operation.
- If there is an equipment malfunction involving a HAULOTTE® product, then contact HAULOTTE Services® immediately even if the malfunction does not involve material and/or bodily damage.

## 2.7 - Product information

Without the written permission from Haulotte, modifying a HAULOTTE® product is a Safety concern. Any modification may violate Haulotte design parameters, government regulations and industry standards.

If you desire a modification to the product, submit a request in writing to HAULOTTE.

With the utmost care to ensure enhanced reliability and greater safety of the HAULOTTE® products, it is pertinent that when a "Service or Safety Bulletin" is issued, action is taken immediately. Once the bulletin has been addressed, make sure that the completed form is submitted to HAULOTTE Services®.

Do not hesitate to contact HAULOTTE Services® , should you have any questions relating to the issued bulletin(s) or with questions on the policy itself.

## 3 - HAULOTTE® new product warranty North America

There is no express warranty except that HAULOTTE® provides the following limited warranty :

Haulotte US Inc ( HAULOTTE®) warrants its new products made by it to be free from defects in material or workmanship for 24 months under normal operational conditions from the warranty start date (delivery date).

In addition, HAULOTTE® further warrants the structural elements of each new product made by it, as defined in its then current warranty policies and procedures, to be free from defects in material or workmanship for 5 years from the warranty start date (delivery date).

HAULOTTE® agrees to repair or replace at its own expense; at its facility in Va Beach Virginia, or by an authorized repair service provider designated by HAULOTTE®, any part or parts of the product found to be defective in material or workmanship, provided HAULOTTE® is notified of such defect or defects within the applicable warranty period and given a reasonable time to correct the defect. In no case shall any warranty extend to defects in materials, components, or services furnished by third parties. Defects caused by chemical action or the presence of abrasive materials and defects arising following the operation beyond rated capacity or the improper use or application of any products shall not be considered defects within the scope of this warranty. If any repairs or alterations are made or any parts are replaced during the applicable warranty periods by anyone other than HAULOTTE® or an entity authorized by HAULOTTE® for use in its products, customer shall pay for such repairs or parts without recourse against HAULOTTE®, and HAULOTTE® should be relieved of responsibility for fulfillment of this warranty with respect to such repairs, alterations, or replacement so made. HAULOTTE® obligations under this warranty shall at all times be subject to its current warranty policies and procedures. The above mentioned warranty shall not apply to replacement or service parts made and sold by HAULOTTE®. Periodic maintenance, periodic maintenance items (including paint and decals), and minor adjustments are excluded from this warranty. Certain components, including, but not limited to, engines, tires/tyres and batteries, which may be part of the product are not manufactured or warranted by HAULOTTE®. Any applicable warranty for such component is provided through the original manufacturer of the component or its distributor organization. HAULOTTE® warranty does not apply to defects caused by negligence, misuse, accidental damage, inadequate or improper use or maintenance, acts of nature and normal wear and tear of the products.

# B-Safety

Under no circumstances shall HAULOTTE® be liable for any consequential or special damages which any person or entity may incur or claim to incur as a result of any defect in the product or in any correction or alteration thereof made or furnished by HAULOTTE® or others. Consequential or special damage includes, but not limited to cost of transportation, lost sales, lost orders, lost profits, lost income, increased over head, labor and material costs, and cost of manufacturing variances and operational inefficiencies. HAULOTTE® maximum liability under this warranty shall be the purchase price paid to HAULOTTE® with respect to the product to which such warranty is claimed. This warranty constitutes HAULOTTE® entire and exclusive warranty as to the product and is the sole and exclusive remedy for the product defects in material and workmanship. HAULOTTE® does not assume (and has not authorized any other person to assume on its behalf) any other warranty or liability in connection with any product covered by this warranty. HAULOTTE® expressly disclaims any and all other warranties of any kind whatsoever as to the product.

**There is no implied warranty of merchantability and no implied warranty of fitness for a purpose. There is no implied warranty of any kind whatsoever.**

This warranty shall be void, if, upon the occurrence of any incident involving any product made by HAULOTTE® and resulting in any personal injury or property damage, customer shall fail to notify HAULOTTE® within 48 hours of such occurrence or permit HAULOTTE® and its representatives to have immediate access to such product and all records of or within the control of the customer relating to the product and occurrence. For the procedure to apply for warranty please refer to the warranty procedure (North America Warranty 2015/3).

## 3.1 - Warranty claims procedure

In order to qualify for warranty coverage, the following conditions must be met :

1. Return of completed "Warranty Registration" form to Haulotte Group / BilJax within 15 days of receipt of product.
2. Notification to Haulotte Group / BilJax Service within 48 hours of any claimed defect, or damage resulting from the claimed defect.
3. Warranty is limited to parts that are determined to be defective by an authorized service dealership in conjunction with Haulotte Group / BilJax Service. This does not include parts worn out due to normal wear and tear.

Haulotte Group / BilJax authorized dealers or distributors are responsible for filing claims under warranty. Listed below is the warranty claims procedure.

4. Contact Haulotte Group / BilJax Customer Service Department at 1-800-537-0540 or visit HAULOTTE® online at www.haulotte-usa.com to report the claim and verify warranty coverage. Machine serial number and machine hours must be provided when call is placed. A call ID number will be created when the call is placed. The service representative will issue the call ID number to you at the end of the call.
5. Identify the components to be claimed under warranty along with description of failure. An RMA number will be issued from Haulotte Group / BilJax to return warranty parts at the time the parts order is placed.
6. Replacement parts will then be sent by Haulotte Group / BilJax to the dealer or distributor. All parts are invoiced at dealer/distributor list price. Credits will be issued when defective parts are returned to Haulotte Group / BilJax under the proper RMA number and found to be defective under warranty.
7. After completing repairs, submit warranty application form and return the defective parts to Haulotte Group / BilJax. Warranty application form and parts must be received within 30 days of claim in order to be eligible for credit. Returned parts are to be sent prepaid and will be credited when part is received and verified. Warranty labor rate will be paid at current rate set by Haulotte Group / BilJax. The amount of labor hours reimbursed will be determined by Haulotte Group / BilJax and will be limited to 4 hours unless approved by Haulotte Group / BilJax Service.
8. The warranty application must include: the issued RMA number, the invoice number for the associated parts, the machine serial number, the machine hours on the date of failure, the issued call ID number, failure and repair description, and requested customer information.

Failure to follow the warranty claims procedure may result in delay in processing claim or denial of the claim. Haulotte Group / BilJax reserves the right to limit or adjust warranty claims with regard to parts, labor, and travel time. Replacement components purchased from suppliers other than Haulotte Group / BilJax are not covered under the terms of this warranty

### 3.2 - WARRANTY REGISTRATION

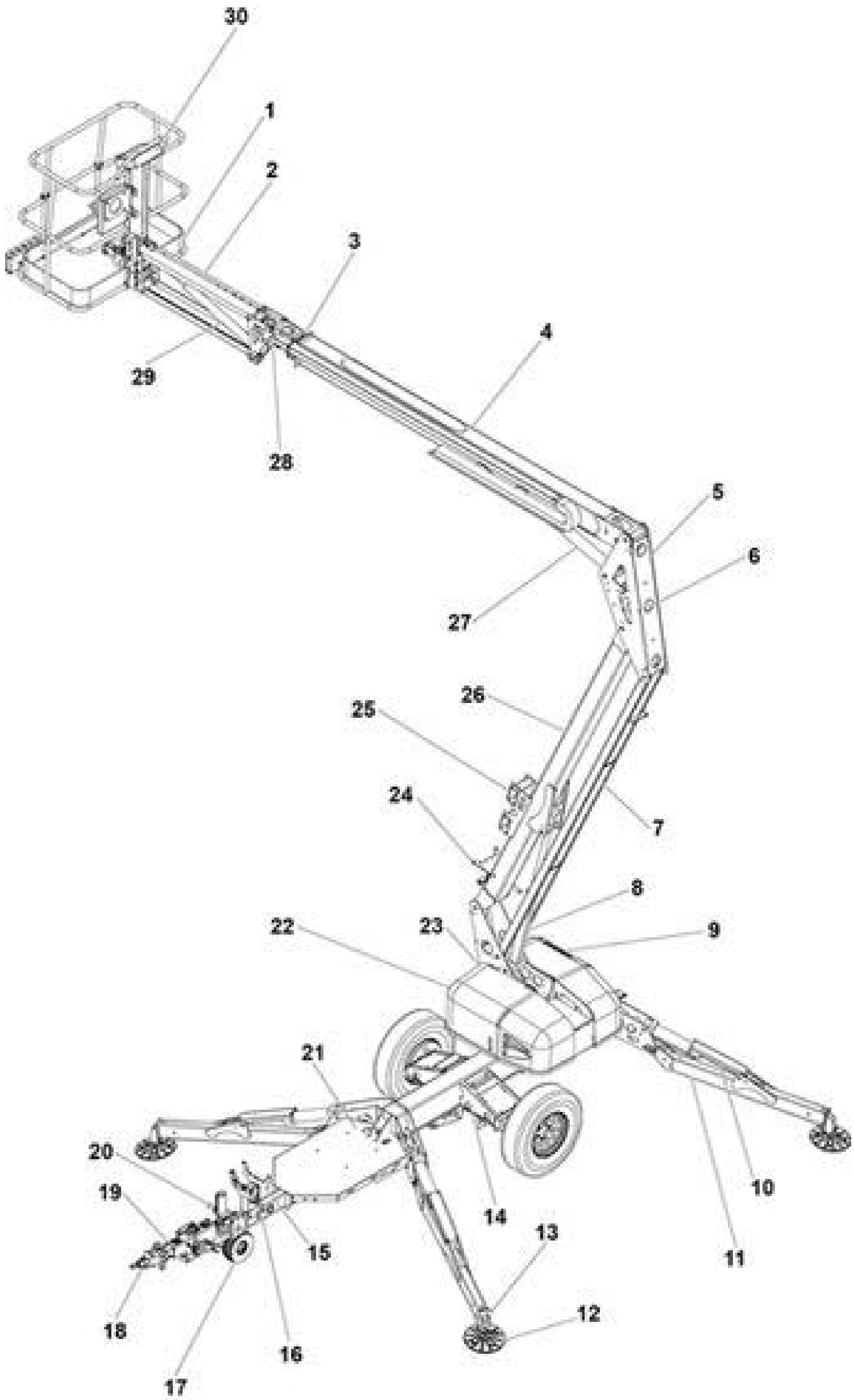
<table>
<tr><th>Owner name :</th><th>Purchased from :</th><th colspan="2">Machine Model :</th></tr>
<tr><td rowspan="2">Address :</td><td rowspan="2">Address :</td><td colspan="2">Machine Serial :</td></tr>
<tr><td colspan="2">Date machine delivered :</td></tr>
<tr><td>City :</td><td>City :</td><td colspan="2">Machine used for :</td></tr>
<tr><td>State :</td><td>State :</td><td colspan="2" rowspan="2">Optional equipment :</td></tr>
<tr><td>Zip code :</td><td>Zip code :</td></tr>
<tr><td>Phone :</td><td>Phone :</td><td colspan="2">Resale :</td></tr>
<tr><td colspan="4">I have received and understand the following :</td></tr>
<tr><td></td><td colspan="3">Operator’s Manual</td></tr>
<tr><td></td><td colspan="3">Operator instructions as given in the Operator’s Manual and by decals</td></tr>
<tr><td></td><td colspan="3">All load capacity decals</td></tr>
<tr><td></td><td colspan="3">Maintenance schedule as given in the Operator’s Manual</td></tr>
<tr><td></td><td colspan="3">Hydraulic system care and use as given in the Operator’s Manual</td></tr>
<tr><td></td><td colspan="3">Warranty in Operator’s Manual with its obligation for owner and dealer</td></tr>
<tr><td colspan="4">Remarks :</td></tr>
<tr><td colspan="4">How was the sale initiated ? (check one)</td></tr>
<tr><td>1. Lead</td><td>2. Cold call</td><td>3. Trade show</td><td>4. Existing customer</td></tr>
<tr><td colspan="4">Type of business? (check one)</td></tr>
<tr><td>1. School</td><td>2. Government</td><td>3. Hotel/Convention Ctr.</td><td>4. Industrial/ Manufacturing</td></tr>
<tr><td>5. Construction</td><td>6. Rental Yard</td><td>7. Service Ctr.</td><td>8. Other</td></tr>
<tr><td colspan="4">I thoroughly understand the Operation and Maintenance of this machine. I also acknowledge the warranty conditions and limitations as outlined in the Operator’s Manual.</td></tr>
<tr><td>Owner or Operator’s Signature</td><td></td><td>Date</td><td></td></tr>
</table>

# Notes

# 1 - Primary machine components

## 1.1 - Layout

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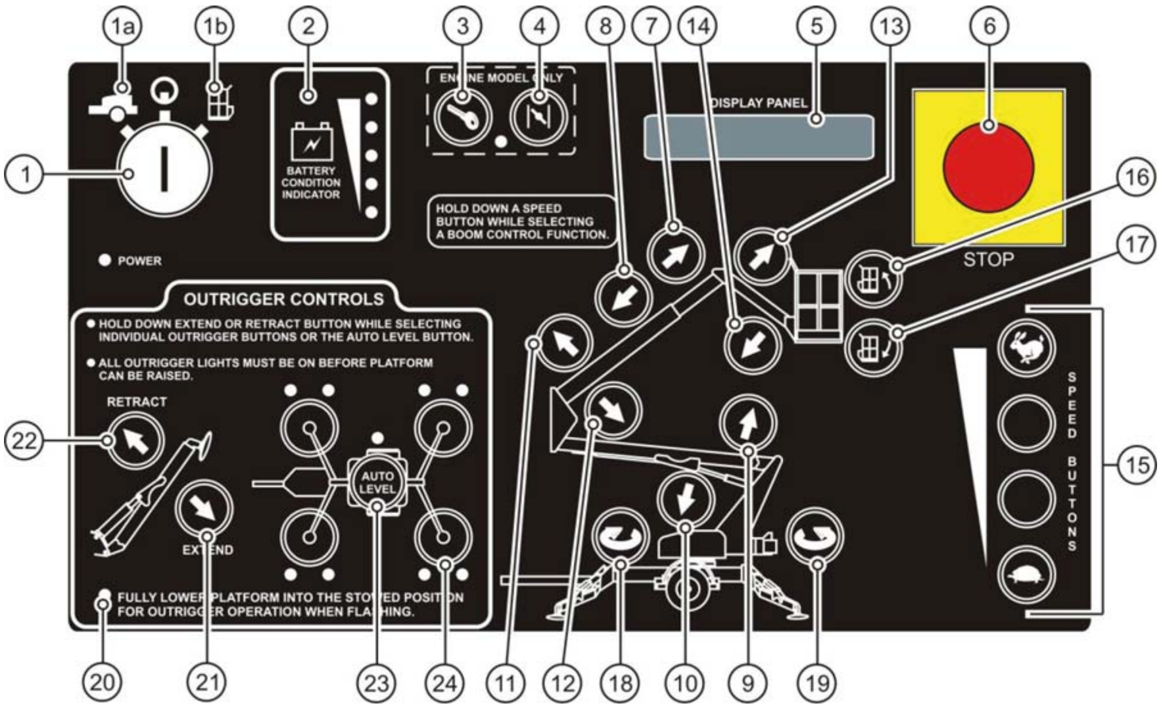
# C-Familiarization

| Marking | Description | Marking | Description |
|---|---|---|---|
| C1 | Platform | C16 | Latch release |
| C2 | Jib boom | C17 | Dolly wheel |
| C3 | Extension boom | C18 | Trailer hitch |
| C4 | Secondary boom | C19 | Coupler |
| C5 | Knuckle | C20 | Jack |
| C6 | Master cylinder | C21 | Generator interface plate |
| C7 | Lower link | C22 | Power unit compartment |
| C8 | Primary lift cylinder | C23 | Turntable |
| C9 | Ground control box | C24 | Secondary boom rest |
| C10 | Outrigger cylinder | C25 | Forklift pocket |
| C11 | Outrigger leg | C26 | Primary boom |
| C12 | Outrigger pad | C27 | Secondary lift cylinder |
| C13 | Outrigger foot | C28 | Slave cylinder |
| C14 | Axle | C29 | Jib lift cylinder |
| C15 | Primary boom rest | C30 | Platform control box |

## 1.2 - Ground control box

### 1.2.1 - Layout

**General view**



## Controls and indicators

| Marking | Description | Function |
|---|---|---|
| 1 | Key Switch | • Turn the KEY SWITCH ( 1 ) to the GROUND ( 1a ) to select operation from the ground control box.<br>• Turn the KEY SWITCH ( 1 ) to the PLATFORM ( 1b ) to select operation from the platform control box.<br>• Turn the KEY SWITCH ( 1 ) to the off position . Power supply is now switched off.<br>• Remove the key to protect against unauthorized operation. |
| 2 | Battery Condition Indicator | Indicator LEDs light up to indicate the level of charge in the batteries :<br>• A lighted green LED indicates an adequate charge level.<br>• A lighted yellow LED indicates the need for charging soon.<br>• A lighted red LED warns that the battery charge level is low; all functional operations become non-functional until the batteries are recharged. |
| 3 - 4 | Engine Start and Choke / Glow Plug[1] | • Start a cold engine : Press and hold the CHOKE ( 4 ) then press the ENGINE START ( 3 ). To start/restart a warm engine, press the ENGINE START ( 3 ).<br>• Press and hold the GLOW PLUG ( 4 ) for 30 - 60 seconds then press the ENGINE START ( 3 ). |
| 5 | Display panel | The DISPLAY PANEL is a lighted text window that displays the current operating status or an existing error condition when the KEY SWITCH ( 1 ) is positioned at either ( 1a ) or ( 1b ). |
| 6 | Emergency stop button | • When pushed in, the EMERGENCY STOP ( 6 ) button disconnects electrical power to the ground (lower) and platform (upper) control boxes<br>• The EMERGENCY STOP button should only be pressed (pushed) in to immediately stop all aerial work platform motion.<br>• To resume control, “pull out” the EMERGENCY STOP ( 6 ). |
| 7 - 8 | Boom Extend / Retract Buttons | • Pressing (pushing) in and holding a desired SPEED/ENABLE ( 15 ) button, and the BOOM EXTEND ( 7 ) button at the same time extends the secondary boom.<br>• Pressing (pushing) in and holding a desired SPEED/ENABLE ( 15 ) button, and the BOOM RETRACT ( 8 ) button at the same time retracts the secondary boom.<br>• Telescopic boom motion continues until the buttons are released, or until the boom reaches a hard stop, or a safe travel limit. |
| 9 - 14 | Boom Raise / Down Buttons and Jib Raise / Down Buttons | • Pressing (pushing) and holding a desired SPEED/ENABLE ( 15 ) button, and the PRIMARY BOOM RAISE ( 9 ) button at the same time will raise the primary boom. Pressing (pushing) and holding a desired SPEED/ENABLE ( 15 ) button, and the PRIMARY BOOM DOWN ( 10 ) button at the same time will retract the primary boom.<br>• Pressing (pushing) and holding a desired SPEED/ENABLE ( 15 ) button, and the SECONDARY BOOM RAISE ( 11 ) button at the same time will raise the secondary boom. Pressing (pushing) and holding a desired SPEED/ENABLE ( 15 ) button, and the SECONDARY BOOM DOWN ( 12 ) button at the same time will retract the secondary boom.<br>• Pressing (pushing) and holding a desired SPEED/ENABLE ( 15 ) button, and the JIB BOOM RAISE ( 13 ) button at the same time will raise the JIB BOOM, pressing (pushing) and holding a desired SPEED/ENABLE ( 15 ) button, and the JIB BOOM DOWN ( 14 ) button at the same time will retract the JIB BOOM.<br>• The selected Boom motion continues until the buttons are released or until the selected boom reaches a hard stop or a safe travel limit. |
| 15 | Speed/Enable buttons | • The SPEED/ENABLE ( 15 ) buttons are located along the lower right side of the control panel, one of the speed/enable buttons must be pressed (pushed) in and held while selecting any boom function.<br>• There are four speeds that range from fast (RABBIT), to slow (TURTLE), available to help control the positioning of the Boom and the Jib. |
| 16 - 17 | Platform Leveling Buttons | • Press (push) and hold any SPEED/ENABLE ( 15 ) button, and the desired PLATFORM TILT UP ( 16 ) or PLATFORM TILT DOWN ( 17 ) button at the same time to level the work platform.<br>• This levels the platform only, NOT the aerial work platform. |

# C-Familiarization

| Marking | Description | Function |
|---|---|---|
| 18 - 19 | Turret Rotation Buttons | • Pressing (pushing) and holding a desired SPEED ( 15 ) button, and the TURRET ROTATION ( 18 ) button at the same time enables the turret to rotate in the CLOCKWISE direction.<br>• Pressing (pushing) and holding a desired SPEED ( 15 ) button, and the TURRET ROTATION ( 19 ) button at the same time enables the turret to rotate in the COUNTER CLOCKWISE direction.<br>• The turret will rotate through 700° of Non-Continuous rotation until the buttons are released or the stop is reached. |
| 20 | Booms stowed LED | • When this LED is "FLASHING" it indicates that the booms are not in the "stowed" position, and the outriggers cannot be operated (non-functional).<br>• When this LED is "ON SOLID" it indicates that the booms are in the "stowed" position, and the outriggers can be operated (functional). |
| 21 - 26 | Outrigger controls | For simultaneous automatic outrigger extension / retraction of all four ( 4 ) outriggers :<br>• Select the EXTEND ( 21 ) button or RETRACT ( 22 ) button and the AUTO LEVEL ( 23 ) button at the same time.<br>To individually extend or retract the outriggers :<br>• Select the EXTEND ( 21 ) button or RETRACT ( 22 ) button, and one of the four OUTRIGGER ( 24 ) buttons at the same time.<br>• The outrigger indicator LEDs ( 20 ) and ( 23 ) light up when the outriggers are properly deployed and the aerial work platform weight is on the outrigger foot pads.<br>• Each of the outer outrigger LEDs ( 25 ) indicates load is on the outrigger foot pad.<br>• Each of the inner outrigger LEDs ( 26 ), when flashing, indicate that side is low, and needs to be further raised for leveling. |
| 27 | Power | • The LED ( 27 ) lights up when power is On. |

1. For machines with engines only

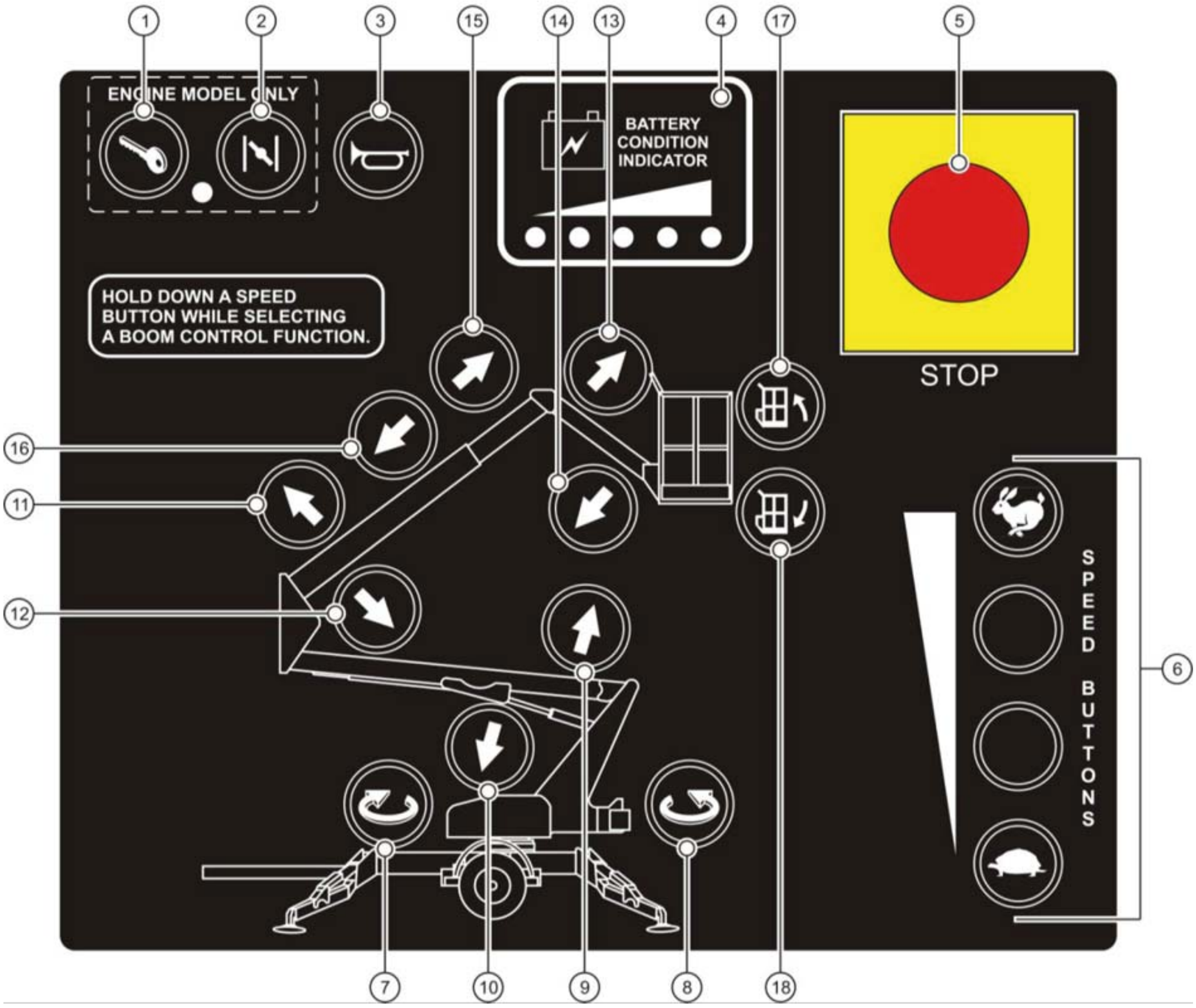


# Notes

## 1.3 - Platform control box

### 1.3.1 - Layout

**General view**



## Controls and indicators

| Marking | Description | Function |
|---|---|---|
| 1-2 | Engine Start and Choke / Glow Plug[1] | • Start a cold engine by pressing (pushing) in and holding the CHOKE ( 2 ) button then press (push) the ENGINE START ( 1 ) button. To start / restart a warm engine, press (push) the ENGINE START ( 1 ) button only.<br>• Glow plug operation : Press (push) the GLOW PLUG ( 2 ) button and hold for 30 - 60 seconds then press (push) the ENGINE START ( 1 ) button |
| 3 | Horn button | Pressing (pushing) the HORN button ( 3 ) will sound the HORN.<br>Use the horn button to warn personnel in the area of a falling object hazard, impending boom motions or the need for assistance. |
| 4 | Battery Condition Indicator | Indicator LEDs light up to indicate the level of charge in the batteries :<br>• A lighted green LED indicates an adequate charge level.<br>• A lighted yellow LED indicates the need for charging soon.<br>• A lighted red LED warns that the battery charge level is low; all functional operations become non-functional until the batteries are recharged. |
| 5 | Emergency stop button | • When pushed in, the EMERGENCY STOP ( 5 ) button disconnects electrical power to the ground (lower) and platform (upper) control boxes<br>• The EMERGENCY STOP button ( 5 ) should only be pressed (pushed) to immediately stop all boom functions.<br>• To resume control, “pull out” the EMERGENCY STOP ( 5 ). |
| 6 | Speed/Enable buttons | • The SPEED/ENABLE ( 6 ) buttons are located along the lower right side of the control panel, one of the speed/enable buttons must be pressed (pushed) in and held while selecting any boom function.<br>• There are four speeds that range from fast (RABBIT), to slow (TURTLE), available to help control the positioning of the Boom and the Jib. |
| 7-8 | Boom Rotation Buttons | • Pressing (pushing) and holding a desired SPEED/ENABLE ( 6 ) button, and the BOOM ROTATION ( 7 ) button at the same time enables the boom to rotate in the CLOCKWISE direction.<br>• Pressing (pushing) and holding a desired SPEED/ENABLE ( 6 ) button, and the BOOM ROTATION ( 8 ) button at the same time enables the boom to rotate in the COUNTER CLOCKWISE direction.<br>• The boom will rotate through 700° of Non-Continuous rotation until the buttons are released or the stop is reached. |
| 9-14 | Boom Raise / Down Buttons and Jib Raise / Down Buttons | • Pressing (pushing) and holding a desired SPEED/ENABLE ( 6 ) button, and the PRIMARY BOOM RAISE ( 9 ) button at the same time will raise the primary boom. Pressing (pushing) and holding a desired SPEED/ENABLE ( 6 ) button, and the PRIMARY BOOM DOWN ( 10 ) button at the same time will retract the primary boom.<br>• Pressing (pushing) and holding a desired SPEED/ENABLE ( 6 ) button, and the SECONDARY BOOM RAISE ( 11 ) button at the same time will raise the secondary boom. Pressing (pushing) and holding a desired SPEED/ ENABLE ( 6 ) button, and the SECONDARY BOOM DOWN ( 12 ) button at the same time will retract the secondary boom.<br>• Pressing (pushing) and holding a desired SPEED/ENABLE ( 6 ) button, and the JIB BOOM RAISE ( 13 ) button at the same time will raise the JIB BOOM, pressing (pushing) and holding a desired SPEED/ENABLE ( 6 ) button, and the JIB BOOM DOWN ( 14 ) button at the same time will retract the JIB BOOM.<br>• The selected Boom motion continues until the buttons are released or until the selected boom reaches a hard stop or a safe travel limit. |
| 15-16 | Boom Extend / Retract Buttons | • Pressing (pushing) in and holding a desired SPEED/ENABLE ( 6 ) button, and the BOOM EXTEND ( 15 ) button at the same time extends the secondary boom.<br>• Pressing (pushing) in and holding a desired SPEED/ENABLE button, and the BOOM RETRACT ( 16 ) button at the same time retracts the secondary boom.<br>• Telescopic boom motion continues until the buttons are released, or until the boom reaches a hard stop, or a safe travel limit. |

# C-Familiarization

| Marking | Description | Function |
|---|---|---|
| 17-18 | Platform Leveling Buttons | • Press (push) and hold any SPEED/ENABLE ( 6 ) button, and the desired PLATFORM TILT UP ( 17 ) or PLATFORM TILT DOWN ( 18 ) button at the same time to level the work platform.<br>• This levels the platform only, NOT the aerial work platform. |
|  | Outlet | An outlet has been provided as a power source for running electrical power tools, while in the work platform. The power plug is located on the trailer frame, in front of the accessory equipment stowage plate. A connecting power cord must be plugged into a suitable power source. The outlet is rated for a 15 A load. Do not overload the accessory power circuit. |

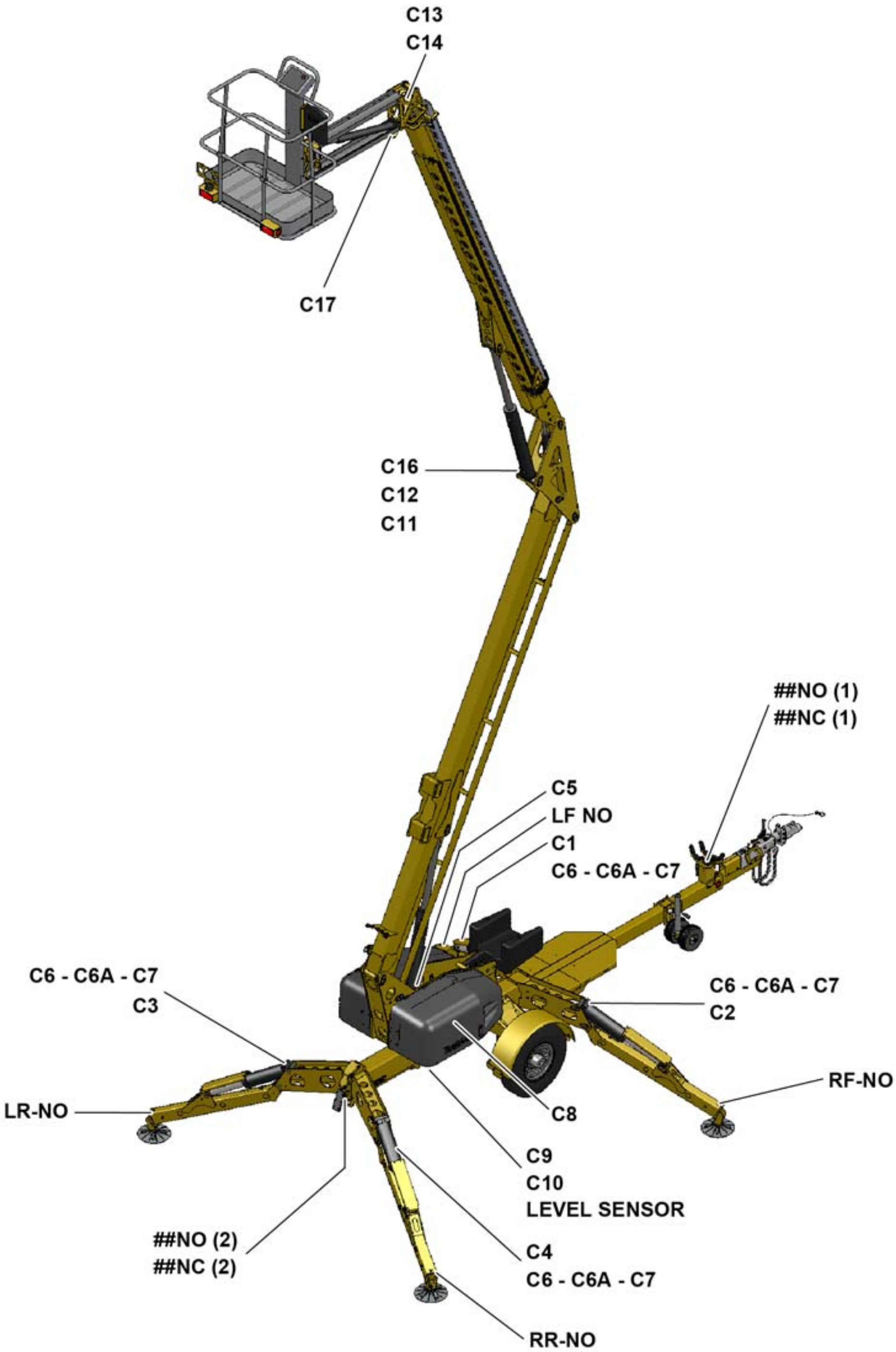
1. For machines with engines only

# Notes

# 2 - List of actuators and sensors

## 2.1 - Sensors and actuators

**Sensors and actuators**



# C-Familiarization

| Description | Name |
|---|---|
| C1 | Front left-hand outriggers control solenoid valve - up / down |
| C2 | Front right-hand outriggers control solenoid valve - up / down |
| C3 | Rear left-hand outriggers control solenoid valve - up / down |
| C4 | Rear right-hand outriggers control solenoid valve - up / down |
| C5 | Valve - Primary boom lift up / down |
| C6 | Valve-Outrigger extend |
| C6A | Valve-Outrigger extend |
| C7 | Valve-Outrigger retract |
| C8 | Proportional solenoid valve |
| C9 | Valve-To rotate the turntable clockwise (CW) |
| C10 | Valve-To rotate the turntable counterclockwise (CCW) |
| C11 | Valve-Telescoping boom extension |
| C12 | Valve-Telescopic boom retraction |
| C13 | Valve-Basket compensation up |
| C14 | Valve-Basket leveling down |
| C16 | Valve - Secondary boom lift up / down |
| C17 | Valve - Jib lift up / down |
| LEVEL SENSOR | Sensor - Tilt bi-directional 3 ° |
| ##NO (1) | Sensor-Boom stowed (Front boom switch) (Normally open) |
| ##NC (1) | Sensor-Boom stowed (Front boom switch) (Normally closed) |
| ##NO (2) | Sensor-Boom stowed (Jib switch) (Normally open) |
| ##NC (2) | Sensor-Boom stowed (Jib switch) (Normally closed) |
| LF NO | Front left-hand outriggers load sensor (Normally open) |
| RF NO | Front right-hand outriggers load sensor (Normally open) |
| LR NO | Rear left-hand outriggers load sensor (Normally open) |
| RR NO | Rear right-hand outriggers load sensor (Normally open) |

# 3 - Power source - Engine specifications

## 3.1 - General safety and specific interventions on motor

The technician should take all steps to protect themselves or others against all risks of injury inherent in his intervention.

The technician should ensure that suitable PPE (personal protective equipment) for the job is used, and check the particular conditions of environment in which the material can be found (see safety information specific to the operation site).

- Turn off the ignition, remove the key, open the battery switch before working on the engine.
- Accidental engine starting can cause injury or death to personnel working on the equipment. To avoid accidental engine starting, disconnect the battery cable from the negative (-) battery terminal. Completely tape all metal surfaces of the disconnected battery cable end in order to prevent contact with other metal surfaces which could activate the engine electrical system. Place a do not operate tag at the start/stop switch location to inform personnel that the equipment is being worked on.
- The hot engine parts can cause injury and burns. Before performing maintenance on the engine, cool the engine and parts.
- By touching a functioning engine, there is a risk of burns from contact with hot parts, and injuries by the rotating parts.
- To avoid any risk of accident, using compressed air (example : blowing air filter), always wear a headband and goggles.
- The hot coolant, steam and alkalis can cause injury. At the operating temperature, the engine coolant is hot and under pressure. Do not open the cap of the expansion chamber before letting the circuit cool.
- The radiator and all the pipes going to the heaters or engine contain hot coolant or steam. Contact can cause severe burns.

**The engine exhaust gases contain harmful combustion products. Always start and run the engine in a well ventilated area. In an enclosed area, evacuate the exhaust outside.**

## 3.2 - General Specifications

***N.B.-:-Using unsuitable fuel may cause diminished performance, difficulties starting, excessive pollution and prematurate wear. To established the type of the fuel suitable for the engine fitted on your HAULOTTE®, please refer to the engine manufacturer's manual. The engine may not be covered by the warranty in case of damage caused by using unsuitable fuel.***

### 3.3 - CONSUMABLES

| Consumable | HAULOTTE® code |
|---|---|
| Air cleaner filter | B20-00-0139 |
| Pressure filter | 2427002910 |
| Oil filter | B20-00-0024 |
| Engine fuel filter - Gas engine | B20-00-0025 |
| Engine fuel filter - Diesel engine | B20-00-0068 |
| Engine belt - Gas engine - Fan | B20-00-0140 |
| Engine belt - Diesel engine - Fan | B20-00-0062 |

### 3.4 - INGREDIENT

| Ingredient | HAULOTTE® code |
|---|---|
| Coolant | 2326013640 |
| Engine oil | 2820305720 |
| Engine oil - Winter option | 4000010660 |
| Hydraulic circuit - Hydraulic oil | 4000025550 |
| Hydraulic oil - Winter option | 2505002640 |

# 4 - Consumables (Oils - Fuels - Engine oil - Coolant level...)

## 4.1 - Fuel

*N.B.-:-THESE FUELS CAN BE USED ON ANY TYPE OF MECHANICAL INJECTION ENGINE. PLEASE SEE MACHINE CONFIGURATION.*

**Table of technically permitted fuels**

| Engines | Fuels | | | |
|---|---|---|---|---|
| Hydraulic filter cartridge | European gas oil according to EN590 | European fuel oil according to BS2869 class 2 | American gas oil according to ASTMD975-07b | Japanese gas oil according to NATO F54 |
| HATZ 41C | ✓ | ✓ | ✓ | ✓ |
| DEUTZ 2011/2012 | ✓ | ✓ | ✓ | ✓ |
| PERKINS 403/804/ 1104 | ✓ | ✓ | ✓ | ✓ |
| LOMBARDINI LDW 1404 | ✓ | ✗ | ✗ | ✓ |
| KUBOTA D1105-W1 | ✓ | ✗ | ✓ | ✗ |
| KUBOTA V2403 | ✓ | ✓ | ✓ | ✓ |
| KUBOTA V2703 | ✓ | ✓ | ✓ | ✓ |

**Compliant**

✓

**Not compliant**

✗

### 4.1.1 - Other fuels

- Biofuels : According to EN14214 (EU) and ASTM D6751-07a (USA) biofuels are allowed on some engines and under certain conditions. For more information, please contact HAULOTTE Services®.
- Jet engine fuels (kerosene) : F34 and F35 types under OTAN designation are possible on some engines and under certain conditions. For more information, please contact HAULOTTE Services®.
- The use of vegetable oils is forbidden.

## 4.2 - Engine oil

The correct SAE viscosity grade of oil is determined by the minimum ambient temperature during cold engine start-up, and the maximum ambient temperature during engine operation.

Generally, use the highest viscosity oil that is available to meet the requirement for the temperature at start-up.

| Engine oil viscosity | | |
|---|---|---|
| EMA LGR-1 / API CH-4 Viscosity grade | Ambient temperature | |
| | Minimum | Maximum |
| SAE 5W30 | -40°C (-40°F) | 30°C (86°F) |
| SAE 15W40 | -20°C (-4°F) | 40°C (104°F) |

***N.B.-:-For additional engine recommendation, refer to the engine manual provided with the machine.***

## 4.3 - Hydraulic oil

External environmental conditions can reduce performance of the machine if the hydraulic oil temperature does not reach its optimum range.

It is recommended to use the hydraulic oil according to weather condition. Refer to the table below.

| Environmental conditions | ISO (Viscosity Index) |
|---|---|
| Ambient temperature between - 15°C (5°F) and + 40°C (104°F) | 32 (175) |
| Ambient temperature between - 35°C (- 31°F) and - 15°C (5°F) | 15 (380) |

***N.B.-:-It is recommended to replace low temperature oil as the ambient temperature reaches + 15°C (59°F). It is not advisable to mix oils of different brands or types.***

# 5 - Machine specifications

## 5.1 - Movement speed

To allow checking operation, refer to the following table about originally time per movement. If the values measured by test are not equal to the following :

- Do not use the machine.
- Setting updating is needed.

Always check speed movement from the ground control box.

| | 3522A - HTA13P | |
|---|---|---|
| Boom - Primary | Primary Up - Fast | 14 - 18 sec |
| | Primary Up - Slow | 33 - 37 sec |
| | Primary Down - Fast | 14 - 18 sec |
| | Primary Down - Slow | 46 - 60 sec |
| Boom - Secondary | Secondary Up - Fast | 12 - 16 sec |
| | Secondary Up - Slow | 24 - 28 sec |
| | Secondary Down - Fast | 18 - 22 sec |
| | Secondary Down - Slow | 62 - 66 sec |
| Boom - Jib | Jib Up - Fast | 10 - 16 sec |
| | Jib Up - Slow | 12 - 16 sec |
| | Jib Down - Fast | 10 - 14 sec |
| | Jib Down - Slow | 26 - 30 sec |
| Extension boom | Boom extend - Fast | 10 - 14 sec |
| | Boom extend - Slow | 22 - 26 sec |
| | Boom retract - Fast | 14 - 18 sec |
| | Boom retract - Slow | 30 - 34 sec |
| Turntable 700° Non Continuous Rotation | Turntable rotation - Fast | 154 - 158 sec |
| | Turntable rotation - Slow | 218 - 222 sec |
| Platform | Platform Leveling Up - Fast | 8 - 12 sec |
| | Platform Leveling Up - Slow | 10 - 14 sec |
| | Platform Compensation Down - Fast | 5 - 9 sec |
| | Platform Compensation Down - Slow | 5 - 9 sec |
| Outrigger (auto level) | Outrigger extend | 12 - 16 sec |
| | Outrigger retract | 22 - 26 sec |

# C-Familiarization

| | 4527A - HTA16P | |
|---|---|---|
| Boom - Primary | Primary Up - Fast | 24 - 28 sec |
| | Primary Up - Slow | 56 - 60 sec |
| | Primary Down - Fast | 22 - 26 sec |
| | Primary Down - Slow | 92 - 96 sec |
| Boom - Secondary | Secondary Up - Fast | 20 - 24 sec |
| | Secondary Up - Slow | 40 - 44 sec |
| | Secondary Down - Fast | 34 - 38 sec |
| | Secondary Down - Slow | 95 - 100 sec |
| Boom - Jib | Jib Up - Fast | 8 - 12 sec |
| | Jib Up - Slow | 14 - 18 sec |
| | Jib Down - Fast | 24 - 28 sec |
| | Jib Down - Slow | 42 - 46 sec |
| Extension boom | Boom extend - Fast | 24 - 28 sec |
| | Boom extend - Slow | 52 - 56 sec |
| | Boom retract - Fast | 28 - 32 sec |
| | Boom retract - Slow | 60 - 64 sec |
| Turntable 700° Non Continuous Rotation | Turntable rotation - Fast | 205 - 209 sec |
| | Turntable rotation - Slow | 335 - 339 sec |
| Platform | Platform Leveling Up - Fast | 8 - 12 sec |
| | Platform Leveling Up - Slow | 8 - 12 sec |
| | Platform Compensation Down - Fast | 6 - 10 sec |
| | Platform Compensation Down - Slow | 6 - 10 sec |
| Outrigger (auto level) | Outrigger extend | 16 - 20 sec |
| | Outrigger retract | 30 - 34 sec |

# C-Familiarization

| | 5533A - HTA19P | |
|---|---|---|
| Boom - Primary | Primary Up - Fast | 18 - 22 sec |
| | Primary Up - Slow | 48 - 52 sec |
| | Primary Down - Fast | 18 - 22 sec |
| | Primary Down - Slow | 150 - 154 sec |
| Boom - Secondary | Secondary Up - Fast | 14 - 18 sec |
| | Secondary Up - Slow | 29 - 33 sec |
| | Secondary Down - Fast | 24 - 28 sec |
| | Secondary Down - Slow | 105 - 109 sec |
| Boom - Jib | Jib Up - Fast | 6 - 10 sec |
| | Jib Up - Slow | 10 - 14 sec |
| | Jib Down - Fast | 20 - 24 sec |
| | Jib Down - Slow | 42 - 46 sec |
| Extension boom | Boom extend - Fast | 24 - 28 sec |
| | Boom extend - Slow | 52 - 56 sec |
| | Boom retract - Fast | 26 - 30 sec |
| | Boom retract - Slow | 55 - 59 sec |
| Turntable 700° Non Continuous Rotation | Turntable rotation - Fast | 200 - 204 sec |
| | Turntable rotation - Slow | 246 - 250 sec |
| Platform | Platform Leveling Up - Fast | 10 - 14 sec |
| | Platform Leveling Up - Slow | 10 - 14 sec |
| | Platform Compensation Down - Fast | 7 - 11 sec |
| | Platform Compensation Down - Slow | 7 - 11 sec |
| Outrigger (auto level) | Outrigger extend | 25 - 29 sec |
| | Outrigger retract | 42 - 46 sec |

# D-Maintenance

## 1 - Equipment Maintenance

Performing the appropriate maintenance procedures will extend the life of the aerial work platform and will help ensure the safety of personnel operating the equipment.

Repair, replacement or adjustment of any hydraulic or electrical control device should be performed only by fully trained and authorized personnel. These include, but are not limited to, hydraulic load valves, hydraulic flow control valves, solenoid valves, and limit switches. These are safety related controls. Improper adjustment or tampering with these devices may impair aerial work platform function and result in safety or damage hazards.

Persons performing maintenance or repairs on the aerial work platform should be trained in accordance with the manufacturer's recommendations. Contact HAULOTTE® Customer Service Department: at 1-800-537-0540 or visit HAULOTTE® online at www.haulotte-usa.com if additional information is needed.

Critical or suspect areas identified during any scheduled inspection of the aerial work platform shall be examined by qualified personnel in accordance with all Federal, State, and Local codes and regulations.

NEVER operate the aerial work platform if a defect or malfunction is identified or suspected. All defects and malfunctions must be repaired, and all maintenance performed, before returning an aerial work platform to service.

This manual contains a list of recommended maintenance procedures to be performed daily, weekly, monthly, and annually. Refer to it when inspecting this machine.

It is the practice of HAULOTTE® to issue Service and / or Safety Bulletins, which may include updates to the information contained in this manual. In such instances, procedures contained in HAULOTTE® Service Bulletins or Safety Bulletins supersede the information contained in manual.

ALWAYS follow the maintenance schedule, regardless of use.

## 1.1 - BATTERY RECHARGE WITH DUAL PRO CHARGER

Recharge aerial work platform batteries after each 8 hour work shift or as needed. When the aerial work platform is not in use, batteries should be recharged at least once per week. Under normal circumstances, battery recharge should take approximately 10 - 12 hours. However, a full recharge may take up to 24 hours, if the battery charge is extremely low.

**Recharge batteries in a well-ventilated area only. Do not charge batteries near fire, spark or other potential ignition sources. Batteries may emit highly explosive hydrogen gas while charging. Failure to properly ventilate the charge gasses could result in death or serious injury. Always charge aerial work platform batteries away from flammable materials.**

**Avoid contact with battery acid. Battery acid causes serious burns and should be kept away from skin or eyes. If contact occurs, flush with water and consult a physician immediately.**

To recharge the aerial work platform batteries :

- Move the aerial work platform to a well-ventilated area with direct access to an AC electrical outlet. Keep the aerial work platform and batteries away from open flame or other potential ignition sources.
- Attach a 12 AWG multi-strand, grounded EXTENSION CORD with a maximum length of 15 m (50 ft) to the receptacle located on the GENERATOR INTERFACE PLATE in front of the turntable.

***N.B.-:-USING AN UNDERRATED OR LONG POWER CORD WILL REDUCE THE OUTPUT OF THE BATTERY CHARGER AND MAY EXTEND CHARGE TIME.***

**Location of battery Charger faceplate**




**DO NOT disconnect any output leads or connectors between the batteries and the charger when the charger is on. To stop a charge in progress, always unplug the extension cord from the AC power source.**

### 1.1.1 - Charging indicators

When battery charging system is activated, the battery status indicator provides charging information utilizing 5 red LED indicators and 1 green LED indicator.

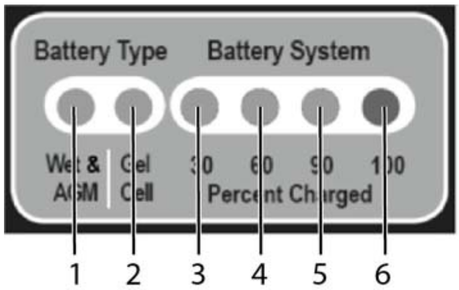
Battery Type Indicators :

- 2 red LED indicators are provided in order to display what type of battery the charger has been programmed to charge.

***N.B.-:-For more information on reconfiguring the battery type, please contact battery charger technical support (800.742.2740).***

Battery System Percent Charged Indicators :

- 4 LED indicators are provided in order to display the progress of the charge cycle in percentage of charge




| | |
|---|---|
| RED LED No. 1 | Illuminated configurated for Wet Cell and AGM batteries |
| RED LED No. 2 | Illuminated configurated for Gel Cell batteries |
| RED LED No. 3 | Charging - Initial Charging Up to 30% |
| RED LED No. 3 - 4 | Charging - 60% Complete |
| RED LED No. 3 - 4 - 5 | Charging - 90% Complete |
| Not applicable to Gel ProfileBlinking GREEN LED | Finishing Stage (Battery Type Indicator will also blink during this stage). |
| Steady GREEN LED N° 6 | Charge complete. Float / Maintenance Mode-On for 5 minutes and off for 60 minutes |

**Always unplug the battery charger power cord before moving the aerial work platform. Failure to disconnect power cord could cause damage to the equipment.**

The green LED is illuminated whenever the charge cycle has terminated and the internal circuitry has determined the batteries to be fully charged. The green LED will blink during the finishing stage of the charge cycle. After the completion of the charge cycle, the green LED will remain on steady during the float-maintenance stage. During this final stage current is only flowing to the battery system for 5 minutes and then current will stop completely for 60 minutes.

The system provides an equalization stage every 30 days while plugged in. If the charger is normally disconnected from A/C after completing charge, equalization can be accomplished by plugging back into A/C whenever this stage is desired. Battery manufacturers recommend that equalization is done once a month in order to further reduce sulfation on the lead plates of a battery, which helps promote longer battery life.

***N.B.-:-During this process the LEDs will go through their normal routine (Red LEDs counting up for % of charge along with the illuminated Red LED Battery Type and then the Green LED and Red Battery Type LED will blink) until the unit returns to the maintenance mode and a steady Green LED and steady Red Battery Type LED.***

### 1.1.2 - Troubleshooting

Problem : No LED indicators illuminated on battery status indicator.

Solution Sequence :

1. Confirm that current is being delivered to the charger. Use a meter or test light to check the AC power supply from its source through all connecting points up to the charger.
2. Check that the AC circuit (on front of the unit) is depressed.
3. Call technical support for further assistance (800.742.2740)

Problem : The charge status indicator changes rapidly back and forth from red to green or the green LED will not illuminate after excessive charging time ( 24 hours or more)

Solution Sequence :

1. Disconnect AC power from the charging system. This indication may signify a possible battery problem.
2. Call Battery Charger technical support for further assistance 800.742.2740

Problem : A green LED was illuminated before disconnecting the power from the charger, but upon reconnection, red LEDs appear and remain on.

This is the normal operating procedure for the system. It indicates that a reanalysis of the battery status was initiated and after a series of steps the green LED will illuminate.

### 1.1.3 - Fault code indicators (LEDs)

The microprocessor is constantly monitoring the charger circuitry and will both detect and display blinking LED indications if a fault is detected. The battery type LED will be OFF during a fault code condition.

30% RED LED BLINKING - No Battery Detected :

- This indication occurs whenever the charger circuitry cannot detect a battery. The charger circuitry will not allow charge current to flow under this condition. With the AC power supply cord unplugged, check the connection to the batteries for proper polarity (black wire to negative or -). Also check for corrosion free secure connections to the battery. Call technical support for further assistance (800.742.2740).

30% & 60% RED LED BLINKING - Forming Stage Timeout Shutdown :

- This indication occurs if the battery voltage has not risen above 1,75 volts per cell within the first 3 hours of charging. This indicates that a possible battery problem exists and that the charge cycle has been terminated at this point. Call technical support for further assistance (800.742.2740).

30% & 60% & 90% RED LED BLINKING - Overall Timer Shutdown :

- This indication occurs if the charger has not completed the charge cycle within the allowable factory set time period. This indicates that a possible battery problem exists and that the charge cycle has been terminated at this point. Call technical support for further assistance (800.742.2740)

30% & 90% RED LED BLINKING - Internal Overtemp Shutdown :

- This indication occurs if the charger circuitry has detected operating temperatures inside the charger enclosure that are above factory specified levels. This could indicate that a possible charger problem exists and that the charge cycle has been terminated. Call technical support for further assistance (800.742.2740)

***N.B.-:-DISCONNECTING AND RECONNECTING THE AC POWER SUPPLY CORD WILL RESET THE CHARGER.***

## 1.2 - Battery recharge with DELTA Q charger

Recharge aerial work platform batteries after each 8 hour work shift or as needed. When the aerial work platform is not in use, batteries should be recharged at least once per week. Under normal circumstances, battery recharge should take approximately 10 - 12 hours. However, a full recharge may take up to 15 hours, if the battery charge is extremely low.

**Recharge batteries in a well-ventilated area only. Do not charge batteries near fire, spark or other potential ignition sources. Batteries may emit highly explosive hydrogen gas while charging. Failure to properly ventilate the charge gasses could result in death or serious injury. Always charge aerial work platform batteries away from flammable materials.**

To recharge the aerial work platform batteries :

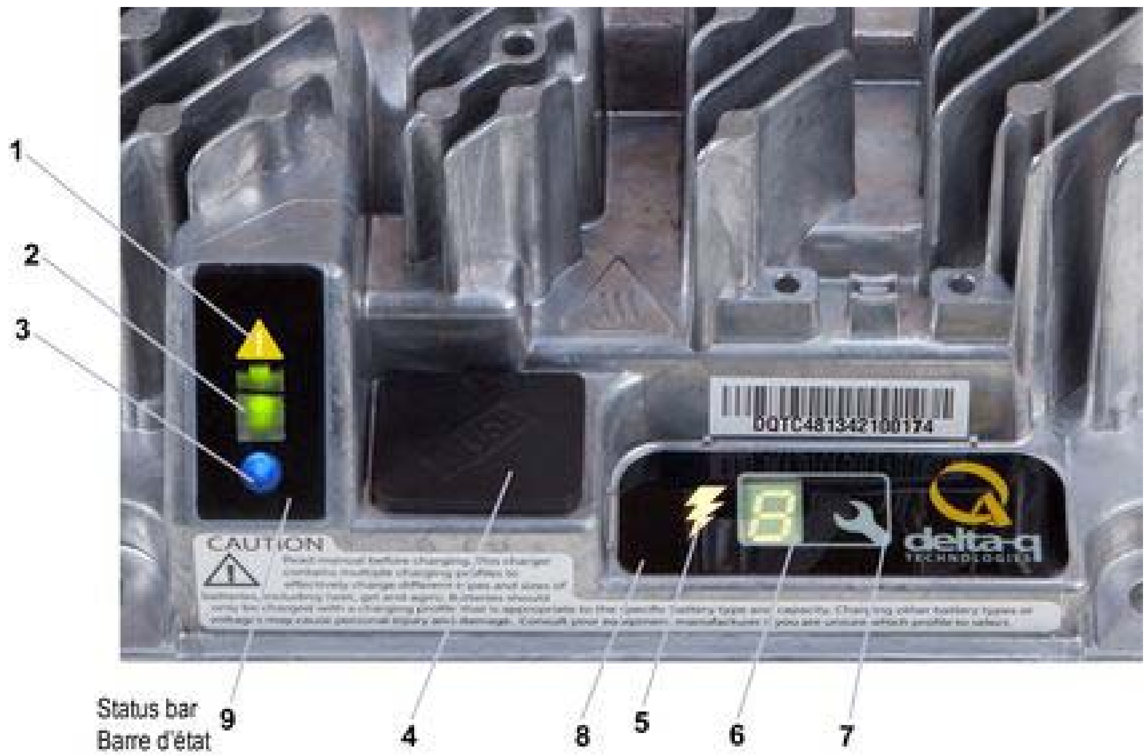
- Move the aerial work platform to a well-ventilated area with direct access to an AC electrical outlet. Keep the aerial work platform and batteries away from open flame or other potential ignition sources.
- Attach a 12 AWG multi-strand, grounded EXTENSION CORD with a maximum length of 15 m (50 ft) to the receptacle located on the GENERATOR INTERFACE PLATE in front of the turntable.

***N.B.-:-USING AN UNDERRATED OR LONG POWER CORD WILL REDUCE THE OUTPUT OF THE BATTERY CHARGER AND MAY EXTEND CHARGE TIME.***

- Plug the extension cord into outlet. Verify that AC Power Indicator ( 3 ) is lit as a solid Blue LED and the Battery Charging Indicator ( 2 ) is lit as a flashing green LED on the front of the Delta Q charger.
- If a Battery fault is detected, a fault code will appear on the Charge Profile / Error Display ( 6 ) (e.g. E-0-0-4.). To understand what the code means please refer to the list of charger fault / error codes under the section “Delta Q Charger Troubleshooting”. The Fault / Error / USB Indicator 1 LED will become lit with Red for Faults and Orange for Errors.
- When the battery charge is between 0-50%, the bottom half of the Battery Indicator ( 2 ) will flash green. When the charge is between 50-99%, the bottom half of the Battery Indicator ( 2 ) becomes solid green while the top half starts flashing green. When the battery is 100% charged the entire Battery Charge Indicator ( 2 ) becomes solid green.
- When the batteries have reached a full charge, the charger enters monitor / maintain mode when charging is complete and the charger remains connected to AC input.
- Unplug the extension cord from the outlet and the charger receptacle on the aerial work platform. Store the extension cord for next use.

**Always unplug the battery charger power cord before moving the aerial work platform. Failure to disconnect power cord could cause damage to the equipment.**

**Delta Q Charger Interface**




**Status bar ( 9 )**

| Marking | Symbol | Color | Description |
|---|---|---|---|
| 1 |  | Solid red | Charger fault. See display panel ( 8 ) for details. |
| |  | Flashing amber | External error condition - caution. See display panel ( 8 ) for details. |
| |  | Flashing green | USB port active. |
| | | Solid green | Safe to remove USB flash drive. |
| 2 |  | Flashing green | Low state of charge. |
| | | Solid green | High state of charge. |
| |  | Flashing green | High state of charge. |
| | | Solid green | Charge completed. |
| 3 |  | Solid blue | AC power available. |

### 1.2.1 - Charging indicators

1. The Charging Output Indicator ( 5 ) is solid yellow when the charger output is active. Take appropriate actions while handling the charger, as there is a risk of electric shock.

2. The USB host port ( 4 ) provides read and write functionality. Using a standard USB flash drive, a user can download charge tracking data and update the charger's software and charging profiles. See B33-04-0113 Delta Q Instruction Manual for more information.

3. The Charge Profile / Error Display ( 6 ) shows one of four possible codes to indicate different conditions :

- "F" codes mean that an internal fault condition has caused charging to stop.
- "E" codes mean that an external error condition has caused charging to stop.
- "P" codes mean that the charger programming mode is active.
- "USB" code meaning that the USB port is active and the flash drive should not be removed.

The "E", "F" and "P" codes are followed by three numbers and a period to indicate different conditions (e.g. E-0-0-4.). See Charger fault codes or Charger error codes for details on these conditions and their solutions. "P" codes indicate the active charging profile number.

### 1.2.2 - Troubleshooting

The IC Series Charger is continuously monitoring itself and its environment for unusual conditions. There are a few indications that may require the user's attention.

| Symptom | Recommended action |
|---|---|
| No indicator lights | Check AC power and connection to batteries. |
| Only blue AC light on | Charger has AC and is waiting connection to batteries or CAN remote control commands. Battery voltage must rise over 0.2V / cell before charging will begin. |
| Solid red Fault / Error / USB Indicator | Read fault code (e.g. F-0-0-1) number on the Charge Profile / Error Display ( 6 ) and refer to the fault code table below. |
| Flashing amber Fault / Error / USB Indicator | Read error code (e.g. E-0-0-1) number on the Charge Profile / Error Display ( 6 ) and refer to the error code table below. |

### 1.2.3 - Fault codes

**Charger fault codes**

| Code | Description | Troubleshooting / Customer Action |
|---|---|---|
| F-0-0-1 | DC-DC failure : LLC excessive leakage fault. | Internal charger fault. Remove AC and battery for minimum 30 seconds and retry charger. If it fails again, contact the manufacturer of your vehicle or machine / or Delta Q Technologies. |
| F-0-0-2 | PFC failure : PFC excessive leakage fault. | |
| F-0-0-3 | PFC has taken too long to boost. | |
| F-0-0-4 | The charger has been unable to calibrate the current offset. | |
| F-0-0-5 | The voltage drop across the DC relay is too high while the relay is closed. | |

### 1.2.4 - Error codes

**Charger error codes**

| Code | Description | Troubleshooting / Customer Action |
|---|---|---|
| E-0-0-1 | Battery voltage over limit in software. Typically 2.5V / cell. | • Check the battery voltage and cable connections.<br>• Check charger voltage model is appropriate for batteries.<br>• This error will automatically clear once the condition has been corrected. |
| E-0-0-2 | Battery voltage too low to start a charge cycle. Algorithm dependent – typically 0.1V / cell. | • Check the battery voltage and cable connections.<br>• Check battery size and condition. Batteries may be over-discharged.<br>• Use another charger to bring the batteries above the minimum voltage.<br>• This error will automatically clear once the condition has been corrected. |
| E-0-0-3 | Charge time limit reached. Algorithm dependent. | • Charger output reduced due to high temperatures. Operate at lower ambient temperature.<br>• Charger output reduced due to low AC voltages. Check AC voltage.<br>• Check for shorted or damaged cells.<br>• Poor battery health. Replace battery.<br>• Very deeply discharged battery. Retry charge.<br>• Poorly connected battery. Check connections.<br>• Extra loads. Turn off other devices running on the battery.<br>• This error will automatically clear once the charger is reset by cycling DC or by loss of AC for over 10 minutes. |
| E-0-0-4 | Battery could not be trickle charged up to the minimum voltage. May also be used for other battery-related errors depending on the algorithm. | • Check for shorted or damaged cells.<br>• Poor battery health. Replace battery.<br>• Check DC connections.<br>• This error will automatically clear once the charger is reset by cycling DC or by loss of AC for over 10 minutes. |
| E-0-0-7 | Charge amp-hour limit reached. Algorithm dependent. | • Charger output reduced due to high temperatures. Operate at lower ambient temperature.<br>• Charger output reduced due to low AC voltages. Check AC voltage.<br>• Check for shorted or damaged cells.<br>• Poor battery health. Replace battery.<br>• Very deeply discharged battery. Retry charge.<br>• Poorly connected battery. Check connections.<br>• Extra loads. Turn off other devices running on the battery.<br>• This error will automatically clear once the charger is reset by cycling DC or by loss of AC for over 10 minutes. |
| E-0-0-8 | Battery temperature out of range. Algorithm dependent. | • Cool or warm batteries as needed.<br>• Check temperature sensor and connections.<br>• This error will automatically clear once the condition has been corrected. |
| E-0-1-2 | Reverse polarity. | • Battery is connected the wrong way around. Check the battery connections.<br>• This error will automatically clear once the condition has been corrected. |
| E-0-1-3 | Battery does not take current. | • Check for an electrical device connected between the charger and the battery which passes through voltage but not current (ie. Diode).<br>• Some lithium algorithm try to charge without detecting battery voltage and will show this fault if it is not connected. Ensure the charger is properly connected to approved equipment.<br>• This error will automatically clear once the charger is reset by cycling DC or AC. |
| E-0-1-6<br>E-0-1-8 | Software upgrade failed. | • Ensure the USB flash drive is properly formatted and is not corrupted.<br>• Ensure the USB flash drive does not draw excessive current.<br>• Copy the install files to the USB flash drive again.<br>• Retry the update by reinserting the USB Flash Drive into the charger.<br>• If software updates continue to fail, contact Delta Q. |

| Code | Description | Troubleshooting / Customer Action |
|---|---|---|
| E-0-1-7 | USB mount / unmount error. | • Remove and re-insert the USB Drive.<br>• Ensure the USB flash drive is properly formatted and is not corrupted.<br>• Ensure the USB flash drive does not draw excessive current.<br>• If the condition persists then remove AC and battery for minimum 30 seconds and retry charger.<br>• If the problem persists then contact Delta Q for further help. |
| E-0-1-9 | Hardware build does not support software version. | • The charger hardware does not support the new software version trying to be programmed. Existing SW is left running. Contact Delta Q. |
| E-0-2-0 | No active algorithm selected. | • Reprogram the charger with its original software, algorithms, and settings.<br>• Use the wrench button to select the correct algorithm if still available on the charger.<br>• The problem will clear automatically when an available algorithm is set on the charger as default. |
| E-0-2-1 | High battery voltage while charging. Algorithm dependent – typically 2.8V / cell. | • When already full, some new batteries may exhibit this error. Cycle the batteries and see if it reoccurs.<br>• Check battery size and condition. Resistive batteries in poor condition may cause this. Some new batteries if charged when already full will also cause this. Cycle the batteries a few times.<br>• Check the battery voltage and cable connections. This error will automatically clear once the condition has been corrected. |
| E-0-2-2 | Low battery voltage while charging. Algorithm dependent – typically 0.1V / cell. | • Another device may be drawing current from the battery.<br>• Check the battery voltage and cable connections.<br>• Check battery size and condition. Batteries may be over-discharged.<br>• Use another charger to bring the batteries above the minimum voltage.<br>• This error will automatically clear once the condition has been corrected. |
| E-0-2-3 | High AC voltage error (>270VAC). | • AC voltage is too high. Connect charger to an AC source that provides stable AC between 85 - 270 VAC / 45-65 Hz. |
| E-0-2-4 | Charger failed to turn on properly. | • Disconnect AC input and battery for 30 seconds. If error persists, contact Delta Q. |
| E-0-2-5 | AC voltage has dipped below 80VAC 3 times in 30 seconds. | • AC source is unstable. This could be caused by an undersized generator and/or input cables that are too long or too small. Connect charger to an AC source that provides stable AC between 85 - 270 VAC / 45-65 Hz.<br>• This error will automatically clear once the condition has been corrected. |
| E-0-2-6 | One or more USB script commands failed. | • Ensure the USB flash drive is properly formatted.<br>• Ensure the right update package is being used.<br>• Copy the install files to the USB flash drive again.<br>• Retry the update by reinserting the USB Flash Drive into the charger.<br>• If software updates continue to fail, contact Delta Q. |
| E-0-2-7 | USB overcurrent fault. | • USB hardware overcurrent protection has been tripped. Remove and reinsert USB flash drive. If condition persists, try using a different USB flash drive. |
| E-0-2-8 | Attempt to select algorithm incompatible with this software. | • Update charger software, continue to use existing algorithm or select a different charging algorithm that is compatible.<br>Notes :<br>• If selection of a different algorithm, then the existing algorithm will remain in the charger.<br>• If upgrading existing algorithm then existing algorithm will be deleted, please contact Delta Q for a software upgrade to run the new algorithm. |
| E-0-2-9 | Cannot transmit on CAN bus. | • Check the physical CAN connector, electrical bus conditions and other CAN modules for correct functioning. For example, check termination resistance is approximately 60 ohms. |
| E-0-3-0 | CAN heartbeat timeout on Battery module. | • May be caused by a missing heartbeat message. Check the CAN bus battery module for correct function.<br>• This error will automatically clear once the condition has been corrected. |

| Code | Description | Troubleshooting / Customer Action |
|---|---|---|
| E-0-3-1 | The V ref for the ADC measurements has triggered an alarm. | • Internal charger error. Remove AC and battery for minimum 30 seconds and retry charger.<br>• If the problem persists, contact Delta Q.<br>• This error will automatically clear once the condition has been corrected. |
| E-0-3-6 | Battery temperature sensor is missing or shorted. | • Check if sensor is connected correctly.<br>• The charger behavior when this fault occurs can be configured. OEMs may contact Delta Q for more information.<br>• This error will automatically clear once the condition has been corrected. |
| E-0-3-7 | CAN Open reprogramming failed. | • Re-try CAN Open download or re-program using the USB.<br>• This error will automatically clear once reprogramming has completed successfully. |
| E-0-3-8 | Fan will not turn. | (Fan-equipped models only)<br>• Check fan connections for loose wires.<br>• Check rotor is not locked, or fan is not obstructed. Inspect the fan and clear the blockage.<br>• This error will automatically clear once the condition has been corrected. |
| E-0-4-0 | Fan voltage pulled low. | (Fan-equipped models only)<br>• Ensure the fan is not stuck, sticking, or otherwise overloaded. |

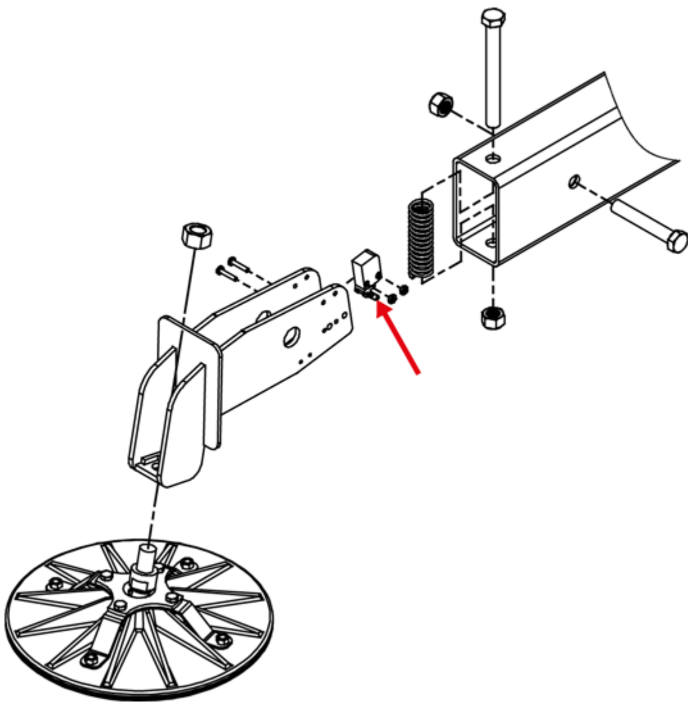
## 2 - Daily service checks

The following maintenance procedures should be performed daily or before each operation :

- Verify that all decals are legible, correctly applied, and in plain view.
- Verify that all controls and indicators at the ground (lower) and platform (upper) control stations operate properly.
    - Lower outriggers to level the aerial work platform.
    - Operate all boom functions, including all jib functions.
    - Press (push) the EMERGENCY STOP button. Verify that all functions are deactivated.
    - Verify that the cylinders are functional and there is no internal leakage, an indication of this is that the booms would not remain elevated, and / or they may drift.
    - Pull out the EMERGENCY STOP button, all functions will now be activated. Lower the booms.
    - If either control panel is unresponsive, refer to the Trouble Shooting procedures.
    - If the GROUND (LOWER) CONTROL DISPLAY PANEL displays an error code. Section F 18.1 - Error code definitions - Controls
    - if the MOTOR CONTROLLER'S green light is flashing there is an error. Section F 18.2 - Error code definitions - Motor controller
- Verify correct operation of turn signals, brakes and running lights.
- Verify proper tire inflation. See the side wall of the tire for proper inflation.
- Inspect tires for damage or loose or missing lug nuts. Repair or replace as necessary.
- Inspect structural components and platform for obvious damage or debris. Repair or replace as necessary.
- Inspect the aerial work platform for missing, loose or damaged fasteners, including pins and bolts.
- Verify that the boom / jib limit switches operate correctly :
    - Limit switches are actuated when the primary, secondary and jib booms are in the fully lowered STOWED position. Limit switches must be activated to raise or lower outriggers.
    - If outrigger controls are unresponsive when the booms are fully lowered and STOWED, inspect the limit switches for loose mounting or visible damage.
    - Repair or replace as necessary (See Outrigger Position Switches Diagram).

- Verify that outrigger safety interlocks operate correctly :
  - Begin with the outriggers fully extended and the aerial work platform leveled. Raise one outrigger until the footpad is not in contact with the ground.
  - Verify that boom functions are unresponsive when one outrigger is raised.
  - Repeat this procedure for each outrigger.
  - Raise all outriggers until the footpads are not in contact with the ground. Verify that all outrigger status LEDs on the ground (lower) control box are unlit.
  - Lower one outrigger until the footpad makes contact with the ground and the outrigger begins lifting the trailer.
  - If the LED is lit before the footpad makes contact with the ground or if the LED remains unlit after the weight is transferred to the outrigger, the position switch or wiring is faulty.
  - Repeat this procedure for each outrigger.
  - Repair or replace as necessary.

**Outrigger Position Switches**

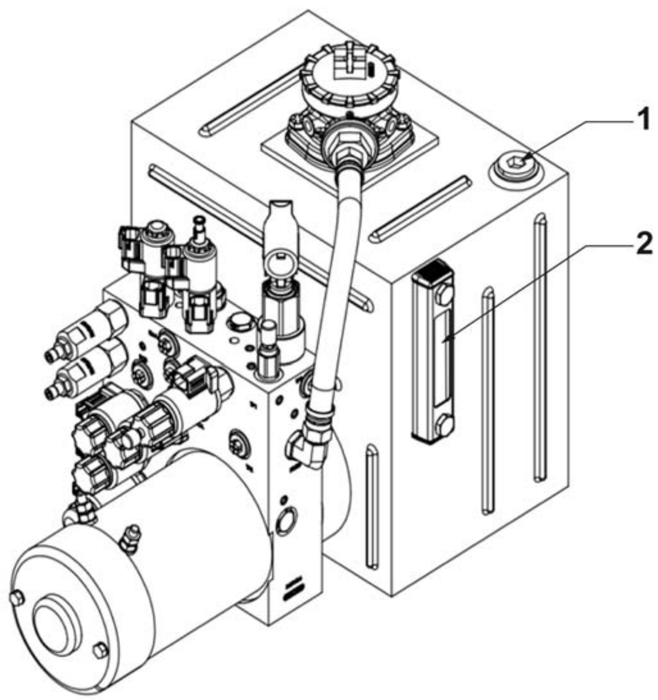


### 2.1 - INSPECT HYDRAULIC SYSTEM AND FLUID LEVELS

- Check all hydraulic hoses and fittings for leaks and / or damage. Tighten or replace as necessary to prevent hydraulic oil or pressure loss.
- The hydraulic oil level should be checked with the booms down, all outriggers raised, and in the "stowed" (upright) position, and the trailer wheels on a level surface.
- Hydraulic oil level should be visible in, but not above, the sight gauge ( 2 ).
- If the hydraulic oil level is not visible to at least half way up the sight gauge, add clean Hydraulic Fluid while all booms are in the "stowed" (down) position, and the outriggers are fully retracted and in the "stowed" (upright) position. Pour slowly through the fill port ( 1 ) to avoid creating air pockets in the reservoir. DO NOT fill above the sight gauge ( 2 ).
- Overfilling the hydraulic reservoir may cause damage to hydraulic lines and may result in aerial work platform malfunction.
- The hydraulic reservoir is originally filled with  HVI AW32 hydraulic oil. A minimum Viscosity Index of 175 is recommended for this aerial lift platform

**Do not mix hydraulic oils. Do not add any fluid to the hydraulic system that is not expressly recommended by the manufacturer. Adding unauthorized fluids to the hydraulic system could cause damage to the aerial work platform.**

**Hydraulic reservoir**



## 3 - Weekly service checks

Perform the following service checks at least once each week in addition to all recommended daily service checks :

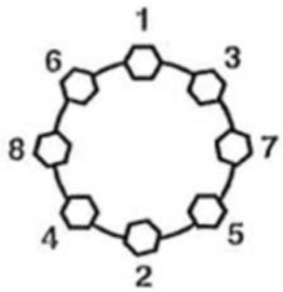
- Check Battery electrolyte level.
    - If battery charge is low, add enough water to bring the electrolyte level to the top of the plates.
    - If batteries are fully charged, raise electrolyte level to full mark in each cell.
- Inspect all electrical wiring.
    - Check for cuts, loose terminals, broken wires, chaffing and corrosion.
    - Repair all damage, remove corrosion and seal with proper materials.
- Inspect transport hitch components for damage. Applicable to trailer mounted aerial lift platforms only.
- Inspect the aerial work platform for missing, loose or damaged hardware. Repair or replace as necessary.
- Inspect all hydraulic system components including the pump, motor and cylinders for damage, leaks, loss of pressure or speed, and unusual noise or vibration. Repair or replace as necessary.
- Inspect Jib Bushings for damage.
    - Check the Jib Bushings, the bushings should not spin or separate from the retaining bore.
    - Replace annually or as necessary.
- Inspect telescoping boom section for missing or damaged wear pads.
    - Check wear pads for loose or missing hardware.
    - Repair or replace as necessary.

## 4 - Monthly service checks

Perform the following service checks at least once each month in addition to all recommended daily and weekly service checks :

- Check battery for loose connections or damaged wires.
- Clean all battery terminals.
- Verify proper operation of manual lowering valves and hand pump. For manual boom operating procedures, refer to the operation section of this manual.
- Lubricate slew ring and mating gear. Use NLGI Grade 2 multi-purpose grease.
- Check wheel nut torque.
    - Evenly tighten wheel nuts to 34 Nm (25 ft lbs) in the tightening sequence shown.
    - Repeat tightening sequence, tighten wheel nuts to 81 Nm (60 ft lbs) and then to 136 Nm (100 ft lbs).

**Wheel Nut Tightening Sequence**




**When wheels are newly installed or replaced, verify wheel nut torque monthly. Follow this procedure each time the wheel is removed and reinstalled. Improperly torqued wheel nuts could result in wheel separation, pre-mature tire wear, or damage to the equipment.**

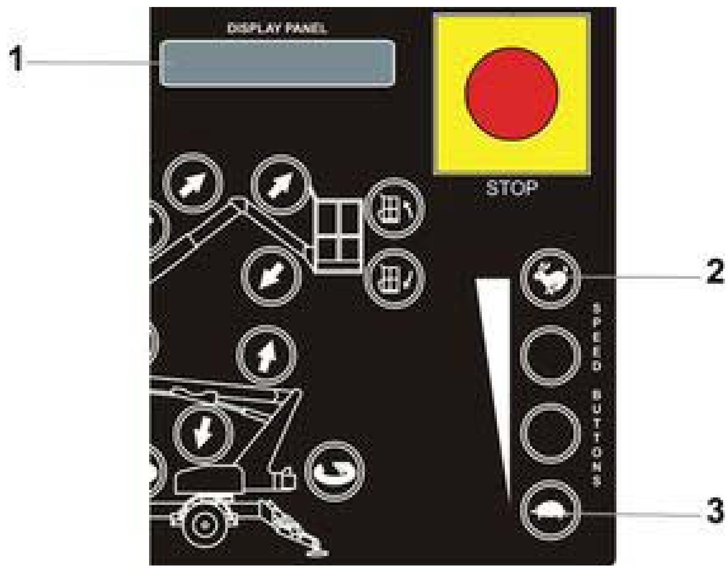
- Check parking brakes — Section F 12 - Set up and Adjustment.
- Verify that the Level Sensor is operating correctly.
    - Fully deploy outriggers until all outrigger LEDs and AUTO LEVEL LED's are lit, and the buzzer at the ground (lower) control panel sounds.
    - Verify that the aerial work platform is level, and that the level sensor located on the control side of the turntable, is giving an accurate reading.
    - Repair or replace as necessary.
- Non linear wearing of the tread profile (>10%).
- Verify the weight reading displayed on the ground (lower) control box is within 10% of actual weight tested. Recalibrate load cell if needed. (For aerial work platforms with material hook option. ) See the "Overload Protection Calibration" procedure.

## 5 - Annual service checks

Perform the following service checks at least once each year :

- Replace hydraulic oil and oil filter.
  - Wipe away dirt and excess oil from the area around the power unit, hoses and filter(s) using cleaning cloths and alcohol solvent.
  - Drain reservoir by removing the hex plug located on the bottom side of the reservoir.
  - After oil is drained, remove oil filter(s) from top of tank.
  - Replace the filter being careful not to introduce any debris into the system. Do not over-tighten.
  - Replace oil with HVI AW32 or equivalent Hydraulic oil with a minimum viscosity rating of 175.
  - With the fill port cap on but not tightened, completely raise and lower the telescoping boom to bleed trapped air from the lift cylinders. Repeat as necessary.
  - Repeat every 100 RUN hours, or annually, which ever comes first. Run hours are displayed by simultaneous pressing (pushing) the RABBIT ( 2 ) and the TURTLE SPEED ( 3 ) buttons on the ground (lower) control box and reading the DISPLAY PANEL ( 1 ).

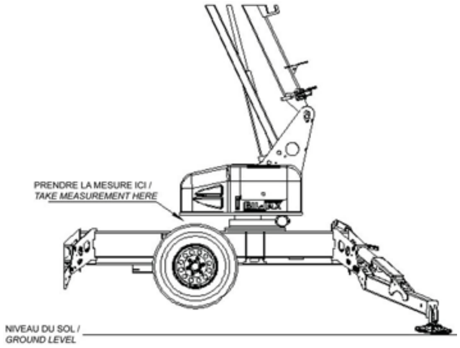
**Display Run Time Hours**



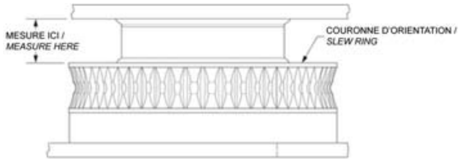

- Inspect pivot pins and cylinders, including rod ends, for wear or damage. Replace as necessary.
- Visually inspect welds and structural components for wear, damage and corrosion.
  - Follow all manufacturer's recommendations when making repairs to critical components.
  - Personnel making repairs to welds should be certified in accordance with the Structural Welding Code AWS D1 and Haulotte design standards.
- Inspect outriggers for wear or damage. Repair or replace as necessary.
- Inspect axle and parking brake, adjust as necessary. Refer to the "Axle and Related Components" section of this manual.
- Load test boom lift operations with 227 kg (500 lb) load.
- Measure war pad thickness.
  - If wear pad thickness is at or below 5,00 mm (0.20 in), remove telescoping boom section and replace all outer and inner wear pads.

## 5.1 - Check slew bearing for wear or damage

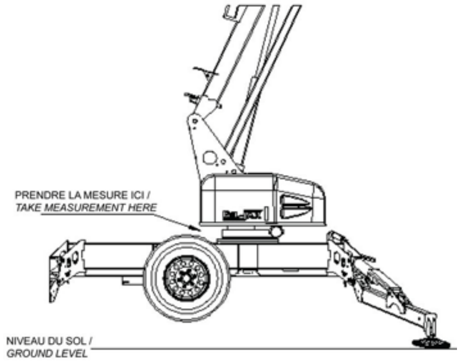
- Deploy the outriggers using the AUTO LEVEL and EXTEND buttons on the ground (lower) control box. The tires will be slightly off the ground in this position.
- Place a 65 kg (175 lb) load in the platform and raise the PRIMARY boom to the full out position.




- Measure the distance between the slew ring gear and the horizontal plate above, using a 50 mm (2 in) caliper or bore micrometer.




- Record the measurement.
- Rotate the platform 180 ° and re-record the measurement.
- If the difference in measurements is greater than 6,35 mm (0.25 in) the slew ring bearing should be replaced. Contact HAULOTTE Group Customer Service Department at 1-800-537-0540 or visit HAULOTTE Group online at www.haulotte-usa.com for additional information.



## 6 - Structural inspection

A comprehensive structural inspection of the unit shall be performed under any of the following conditions :

- 10 years from the date of manufacture and every 5 years thereafter.
- After any actual, suspected or potential damage is sustained that could affect the structural integrity or stability of the aerial work platform.
- After a change in ownership. Owners should provide a complete service history when reselling the unit. The structural inspection shall include the following considerations :
    - The service history of the unit, including hours of service, work performed and environmental conditions.
    - The inspection and maintenance record of the aerial work platform.
    - The effectiveness of all controls and components.
    - A visual inspection of the aerial work platform for wear or damage.
    - Manufacturer recommendations.
    - A visual weld inspection, to be performed by qualified personnel in accordance with the Structural Welding Code AWS D1 and Haulotte design standards.

## 7 - Motor drying instructions

Inclusion of water or foreign particles into the DC electric motor housing may cause serious damage to the motor. If the motor becomes wet, follow these instructions or contact an authorized HAULOTTE® service technician :

- Remove brush cover band.
- Blow warm air into motor using a heat gun.
- Spray electrical contact cleaner solution into motor armature area.
- Replace brush cover band.

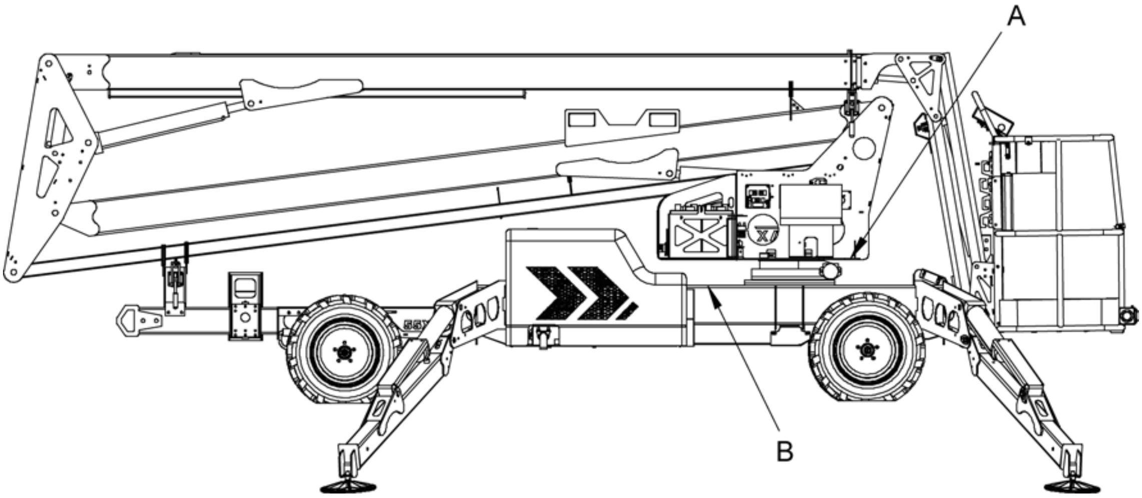
# 8 - Leveling system calibration procedure

## 8.1 - Machine levelling instructions

Deploy all of the outriggers, and slightly raise the base of the machine to position it for leveling.

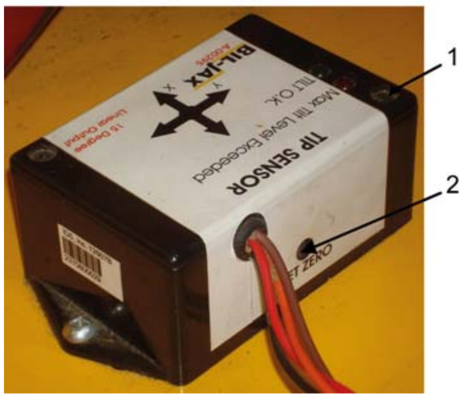
Place a small, standard "level" on the base of the turntable (Level Placement Option A). If a small "level" is not available, place any size, standard "level" on the base of the machine (Level Placement Option B). Using the outriggers individually, level the base of the machine.

**Position Machine for Leveling**




## 8.2 - Level Sensor Calibration Instructions

If your level sensor resembles the image beside (digitally based level sensor), follow these instructions. Be aware that the LED's ( 1 ) on the top of the sensor will need to be observed, the "Max Tilt Level Exceeded" LED is red, and the "TILT OK" LED is green.

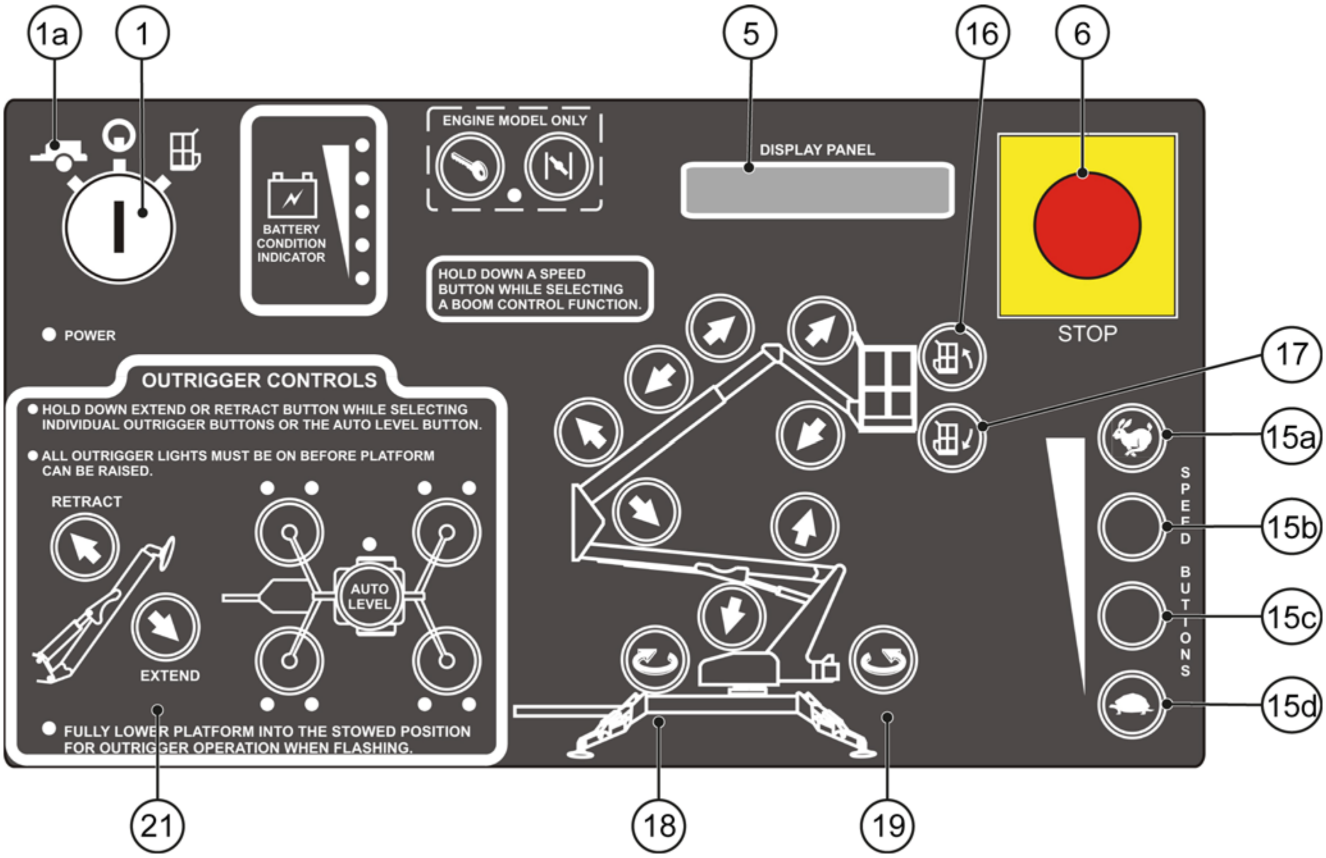



- Press (push) and hold the SET ZERO button ( 2 ), located on the rear of the sensor, for 5 seconds. Both LED's will begin to flash.
- While they are flashing, release the SET ZERO button, and press (push) again 5 times within the next 3 seconds.
- Both the red and the green LED will be "ON SOLID", after several moments the red LED should turn "OFF", the "green" LED will stay lit. This is an indication that the sensor "recognizes" this level position.
- Proceed to the "ground (Lower) control box calibration Instructions".

## 8.3 - Ground control box Calibration Instructions

Use the ground (lower) control box to access the control box maintenance menu.

**Ground (Lower) Control box for Leveling System**




1. Verify that the KEY SWITCH ( 1 ) is turned to the GROUND ( 1a ) icon, and that both E-STOP ( 6 ) buttons (ground and platform) are "pulled out".
2. Enter the maintenance mode by pressing (pushing) both ROTATE ( 18-19 ) buttons and the OUTRIGGER EXTEND ( 21 ) button on the ground control box simultaneously and holding for 5 seconds.
3. Scroll through the maintenance menu using the TURTLE ( 15d ) button to scroll down, use the RABBIT ( 15a ) button to scroll back up, until " LEVEL SENSOR CALIBRATION UTILITY" is displayed in the DISPLAY PANEL ( 5 ). The display will automatically change to " LEVEL MACHINE THEN PRESS MID-SPEED KEYS".
4. Press (push) both MID SPEED buttons [MID-HIGH ( 15b ) / MID-LOW ( 15c )] on the ground (lower) control box simultaneously. 3 consecutive beeps will sound indicating the calibration is confirmed.
5. Exit the maintenance mode by scrolling through the menu using the TURTLE ( 15d ) button.

## 9 - Additional service information

Seals on hydraulic cylinders should be replaced every 5 years or as indicated by machine performance.

All service checks should be performed on an aerial work platform that has been stored without use for a period exceeding 30 days.

Check for air in the hydraulic system if the aerial work platform has been stored without use for a period exceeding 30 days, or if the aerial work platform was stored without use during a seasonal climate change. Air trapped in the hydraulic system will affect aerial work platform performance. Follow procedures for bleeding air from the hydraulic system, found in the "Cylinder Replacement" section of this manual.

Owners and lesser should complete a full inspection of all components and perform a test of all functions, including brake functions, before commissioning or reselling the aerial work platform. Always repair or replace all damaged or malfunctioning components before commissioning or reselling aerial work platform.

When a change in ownership occurs, it is the responsibility of the seller to provide the new owner with all manuals for the aerial work platform. It is the responsibility of the buyer to notify the manufacturer of the unit model, serial number and the name and address of the new owner within 60 days of the purchase.

Use the Service Checklists found at the end of this manual to record all Service Checks as well as any maintenance, repairs or alterations performed on the aerial work platform.

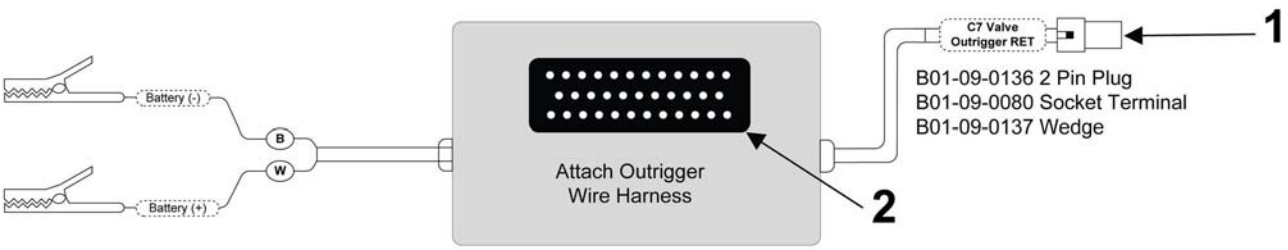
Records of frequent safety checks need not be made. However, where a safety hazard is found, it shall be reported in writing to the owner of the aerial work platform, and a record of any corrective action shall be maintained for 5 years or as required by the authority having jurisdiction.

# 10 - Manual outrigger retraction

The Manual Outrigger Retraction procedure allows the outriggers to be retracted into the "stowed" (upright) position during hydraulic power interruption or power failure.

The Manual Outrigger Control Kit, Part Number: A-00819, including a wire harness, is required to perform this manual procedure.

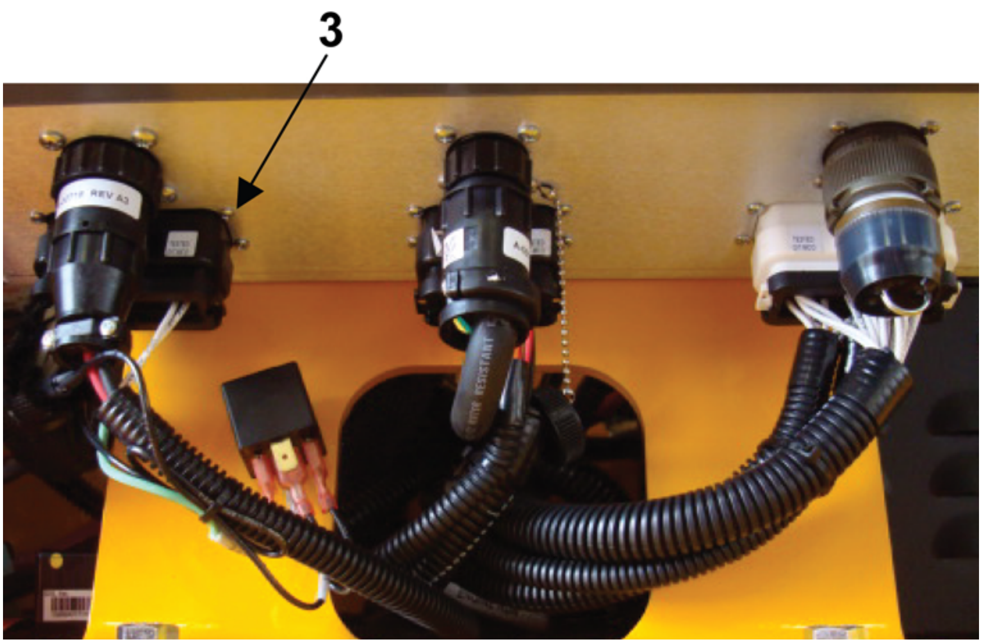
**Manual outrigger Control Wire Harness**



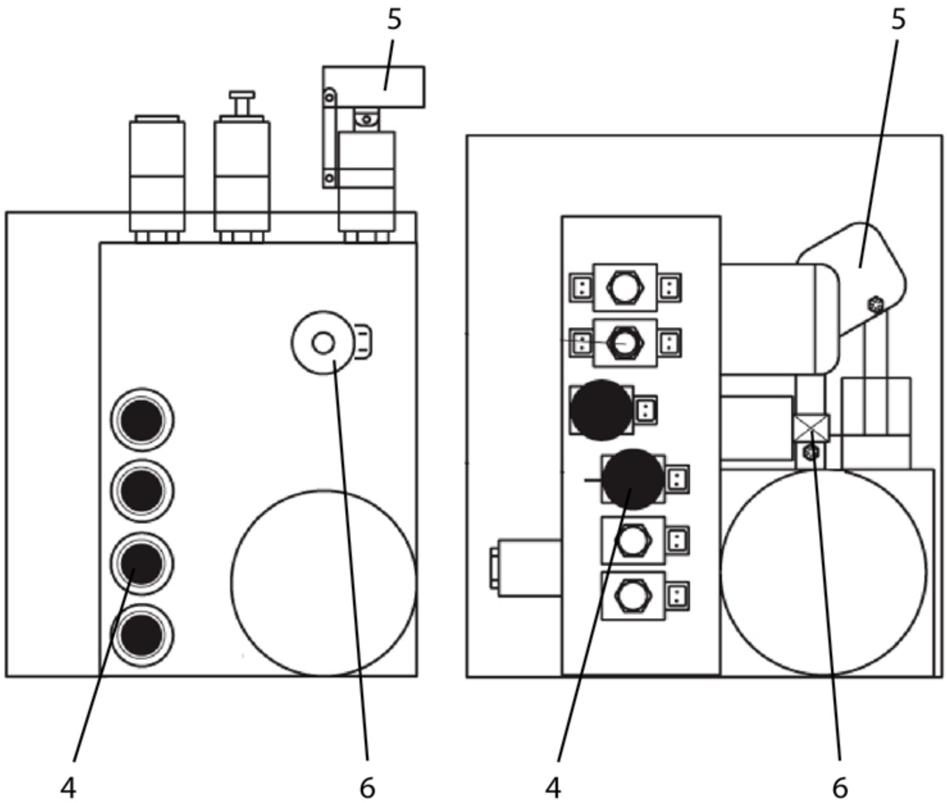

The hand pump is a component of the hydraulic power unit which is located in the pump compartment. "The hand pump and the hydraulic valve C7 (4); must be used to manually retract the outriggers".

The boom(s) must be completely lowered and in the "stowed" position prior to raising the outriggers. Use manual controls if necessary to “stow” the booms. If necessary, refer to Section D : 5.1 Manual boom operation.

**Bottom Side of the Ground (lower) Control Box**



**Hydraulic Power Unit**




Procedure to raise the outriggers manually :

- Disconnect the outrigger's wire harness ( 3 ) from the ground control box.
- Plug it into the receptacle ( 2 ) on the Manual Outrigger Control Wire Harness.
- Disconnect the wire harness from C7 VALVE ( 4 ) on the hydraulic power unit and replace it with the Outrigger controls cable ( 1 ).
- Turn the PROPORTIONAL VALVE ( 6 ) counterclockwise until it stops.
- Attach battery +/- clips to the battery. If the battery on the lift has no charge, use an alternate 12V power source.
- Insert the tire iron into the PUMP HANDLE RECEPTACLE ( 5 ) on hydraulic power unit and actuate the PUMP HANDLE to raise the outriggers.

***N.B.-:-BEFORE RESUMING NORMAL OPERATION, TURN THE PROPORTIONAL VALVE-( 6 ) CLOCKWISE TO RETURN IT TO ITS ORIGINAL POSITION.***

## 11 - Hydraulic pressure gauge

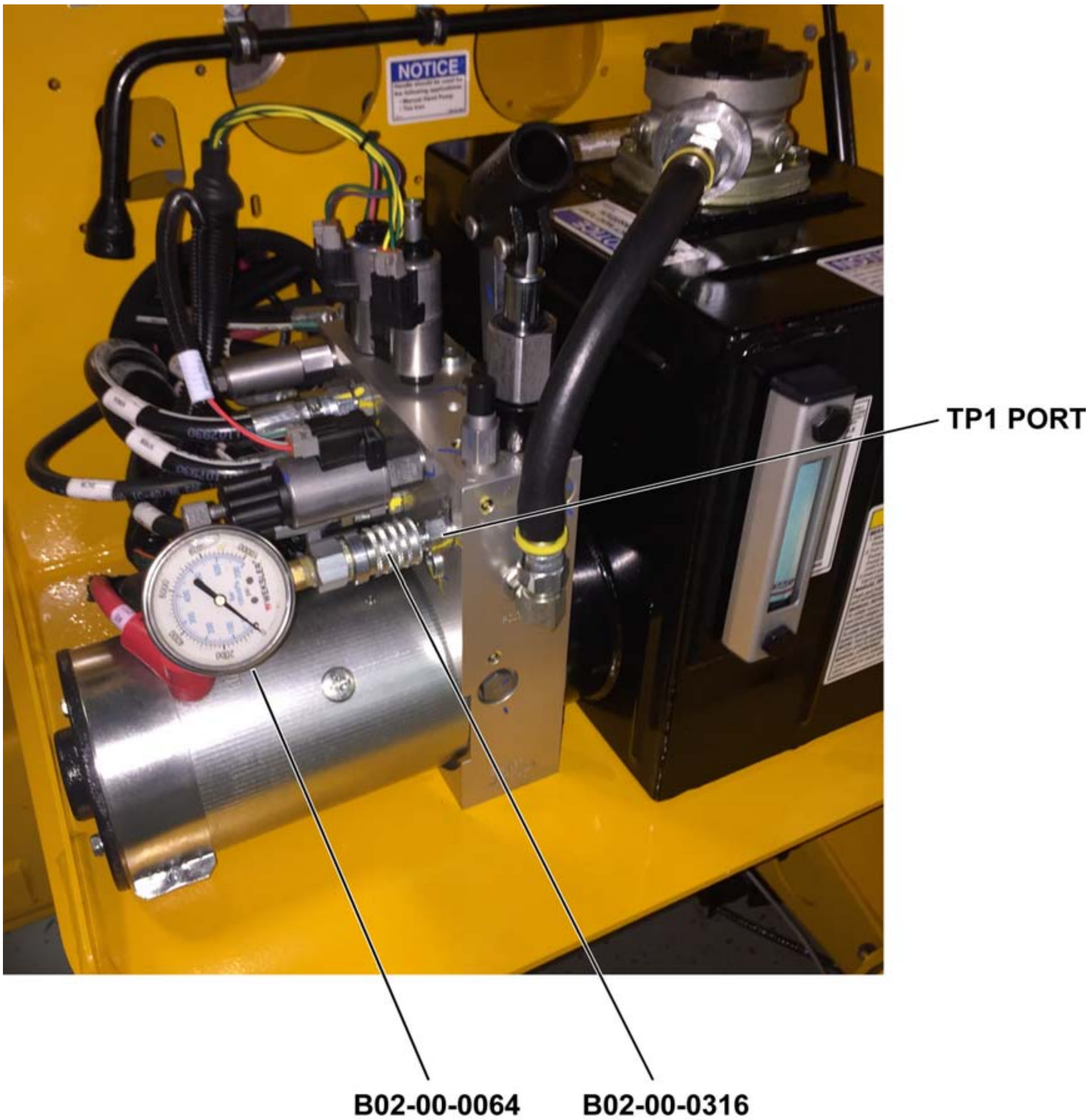
The Hydraulic Pressure Gauge Part Number B02-16-0020 is used to measure the aerial work platform's system pressure. It is used as a diagnostic tool when the Boom is NOT performing as expected.

The female quick disconnect is attached to the Hydraulic Power Unit at the TP1 port.

The Pressure Gauge is composed of :

- B02-00-0064 - Pressure Gauge that measures from 0-5000 psi (351 kg/cm2) (34473 kPa).
- B02-02-0316 - Female Quick Disconnect.
- B02-02-0269 - Male Quick Disconnect (mates to B02-02-0316).

**Attaching the Pressure Gauge to the Hydraulic Power Unit**



# 12 - Axle and related components

If you have a North American - ANSI aerial lift platform refer to - Dexter Axle and Related Components.

If you have a European - CE aerial lift platform refer to - Bradley Brake Adjustment.

## 12.1 - Dexter Axle and Related Components

The following sections are reprinted from the Dexter Axle Operation and Maintenance Manual 2008.

### 12.1.1 - Set up and Adjustment

For proper performance, all new axles should have the following checked at the specified intervals :
- Wheel Nut Torque : at 16, 40 and 80 kilometers ( 10, 25 and 50 miles).
- Brake Adjustment : at 322 and 4.828 kilometers ( 200 and 3,000 miles).
- Tire Pressure : to manufacturer's requirements.
- Brake Synchronization : set brake controller per controller manufacturer's directions.

#### *12.1.1.1 - General maintenance - Electric Brakes*

##### 12.1.1.1.1 - Drum Brake Adjustment

Most Dexter 12 1/4" electric brakes have a self adjusting feature. If manual adjusting is required, use the following procedure :

Brakes should be adjusted ( 1 ) after the first 322 kilometers ( 200 miles), of operation when the brake shoes and drums have "seated", ( 2 ) at 4.828 kilometers ( 3,000 miles) intervals, ( 3 ) or as use and performance requires. The brakes should be adjusted in the following manner :

1. Jack up trailer and secure on adequate capacity jack stands. Follow trailer manufacturer's recommendations for lifting and supporting the unit. Make sure the wheel and drum rotates freely.

**DO NOT lift or support the trailer on any part of the axle or suspension system. NEVER go under any trailer unless it is properly supported on jack stands which have been rated for the load. Improperly supported vehicles can fall unexpectedly and cause serious injury or death.**

2. Remove the adjusting hole cover from the adjusting slot on the bottom of the brake backing plate.

3. With a screwdriver or standard adjusting tool, rotate the star wheel of the adjuster assembly to expand the brake shoes. Adjust the brake shoes out until the pressure of the linings against the drum makes the wheel very difficult to turn.

*N.B.-:-For drop spindle axles, a modified adjusting tool may be necessary.*

4. Then rotate the star wheel in the opposite direction until the wheel turns freely with a slight lining drag.

5. Replace the adjusting hole cover and lower the wheel to the ground.

6. Repeat the above procedure on all brakes. For best results, the brakes should be set at the same clearance.

### *12.1.1.2 - General maintenance - Hydraulic brakes*

#### 12.1.1.2.1 - Drum Brake Adjustment - Manual

Most Dexter 12 1/4" hydraulic brakes have a self adjusting feature. If manual adjusting is required, use the following procedure :

Brakes should be adjusted ( 1 ) after the first 322 kilometers ( 200 miles), of operation when the brake shoes and drums have "seated", ( 2 ) at 4.828 kilometers ( 3,000 miles) intervals, ( 3 ) or as use and performance requires. The brakes should be adjusted in the following manner :

1. Jack up trailer and secure on adequate capacity jack stands. Follow trailer manufacturer's recommendations for lifting and supporting the unit. Make sure the wheel and drum rotates freely.

**DO NOT lift or support the trailer on any part of the axle or suspension system. NEVER go under any trailer unless it is properly supported on jack stands which have been rated for the load. Improperly supported vehicles can fall unexpectedly and cause serious injury or death.**

2. Remove the adjusting hole cover from the adjusting slot on the bottom of the brake backing plate.

3. With a screwdriver or standard adjusting tool, rotate the star wheel of the adjuster assembly to expand the brake shoes. Adjust the brake shoes out until the pressure of the linings against the drum makes the wheel very difficult to turn.

***N.B.-:-FOR DROP SPINDLE AXLES, A MODIFIED ADJUSTING TOOL MAY BE NECESSARY.***

4. Then rotate the star wheel in the opposite direction until the wheel turns freely with a slight lining drag.

5. Replace the adjusting hole cover and lower the wheel to the ground.

6. Repeat the above procedure on all brakes. For best results, the brakes should be set at the same clearance.

#### 12.1.1.2.2 - Synchronizing Your Trailer Brakes

To insure safe brake performance and synchronization, read the brake controller manufacturer's instructions completely before attempting any synchronization procedure.

**Before road testing, make sure the area is clear of vehicular and pedestrian traffic. Failure to brake safely could result in an accident and personal injury to your self and / or others.**

Make several hard stops from 32 Km/h ( 20 mph) on a dry paved road free of sand and gravel. If the trailer brakes lock and slide, decrease the gain setting on the controller. If they do not slide, slightly increase the gain setting. Adjust the controller just to the point of impending brake lockup and wheel skid.

***N.B.-:-NOT ALL TRAILER BRAKES ARE CAPABLE OF WHEEL LOCKUP. LOADING CONDITIONS, BRAKE TYPE, WHEEL AND TIRE SIZE CAN ALL AFFECT WHETHER A BRAKE CAN LOCK. IT IS NOT GENERALLY CONSIDERED DESIRABLE TO LOCK UP THE BRAKES AND SLIDE THE TIRES. THIS CAN CAUSE UNWANTED FLAT SPOTTING OF THE TIRES AND COULD ALSO RESULT IN A LOSS OF CONTROL.***

If the controller is applying the trailer brakes before the tow vehicle brakes, then the controller adjustment should be made so the trailer brakes come on in synchronization with the tow vehicle brakes. For proper braking performance, it is recommended that the controller be adjusted to allow the trailer brakes to come on just slightly ahead of the tow vehicle brakes. When proper synchronization is achieved there will be no sensation of the trailer "Jerking" or "Pushing" the tow vehicle during braking.

**DO NOT attempt to repair or modify a damaged wheel. Even minor modifications can cause a dangerous failure of the wheel and result in personal injury or death.**

#### 12.1.1.2.3 - Torque Requirements

In June of 2004, Dexter Axle ceased production of trailer wheels. If the vehicle is equipped with Dexter steel wheels manufactured before that date, the following wheel torque information will be applicable.

If the trailer is equipped with wheels produced by other manufacturers, consult the vehicle manufacturer to determine the appropriate torque level for the wheels. However, you must not exceed the limits of the wheel mounting studs on the axles.

It is extremely important to apply and maintain proper wheel mounting torque on your trailer axle. Torque is a measure of the amount of tightening applied to a fastener (nut or bolt) and is expressed as length force. For example, a force of 40 kilograms ( 90 pounds) applied at the end of a wrench 0.304 meters ( 1 ft) long will yield 122 N-m ( 90 ft-lb) of torque. Torque wrenches are the best method to assure the proper amount of torque is being applied to a fastener.

**Wheel nuts or bolts must be tightened and maintained at the proper torque levels to prevent loose wheels, broken studs, and possible dangerous separation of wheels from your axle, which can lead to an accident, personal injury or death.**

Be sure to use only the fasteners matched to the cone angle of your wheel (usually 60 ° or 90 °). The proper procedure for attaching your wheels is as follows :

Start all bolts or nuts by hand to prevent cross threading.

Tighten bolts or nuts in the sequence shown for Wheel Torque Requirements.

The tightening of the fasteners should be done in stages. Following the recommended sequence, tighten fasteners per wheel torque requirements diagram.

Wheel nuts / bolts should be torqued before the first road use and after each wheel removal. Check and re-torque after the first 16, 40, and 80 kilometers ( 10, 25 and 50 miles). Check periodically thereafter.

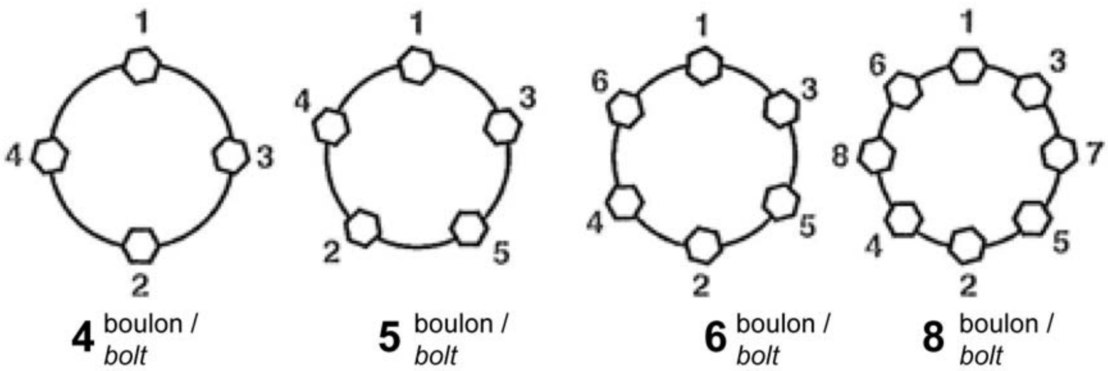
**Wheel torque requirements (For Dexter Steel Wheels Prior to June of 2004)**

| Torque sequence | | | |
|---|---|---|---|
| Wheel Size | 1st Stage | 2nd Stage | 3rd Stage |
| 12" | 27-34 N-m (20-25 ft-lb) | 47-54 N-m (35-40 ft-lb) | 68-102 N-m (50-75 ft-lb) |
| 13" | 27-34 N-m (20-25 ft-lb) | 47-54 N-m (35-40 ft-lb) | 68-102 N-m (50-75 ft-lb) |
| 14" | 27-34 N-m (20-25 ft-lb) | 68-81 N-m (50-60 ft-lb) | 122-162 N-m (90-120 ft-lb) |
| 15" | 27-34 N-m (20-25 ft-lb) | 68-81 N-m (50-60 ft-lb) | 122-162 N-m (90-120 ft-lb) |
| 16" | 27-34 N-m (20-25 ft-lb) | 68-81 N-m (50-60 ft-lb) | 122-162 N-m (90-120 ft-lb) |
| 16.5" x 6.75" | 27-34 N-m (20-25 ft-lb) | 68-81 N-m (50-60 ft-lb) | 122-162 N-m (90-120 ft-lb) |
| 16.5" x 9.75" | 75-81 N-m (55-60 ft-lb) | 162-169 N-m (120-125 ft-lb) | 237-305 N-m (175-225 ft-lb) |
| 14.5" Demont | Tighten sequentially to | | 115-128 N-m (85-95 ft-lb) |
| 17.5" Hub Pilot, Clamp Ring and Cone Nuts | 68-81 N-m (50-60 ft-lb) | 135-162 N-m (100-120 ft-lb) | 257-284 N-m (190-210 ft-lb) |
| 17.5" Hub Pilot 5.16" Flange Nuts | 68-81 N-m (50-60 ft-lb) | 122-270 N-m (90-200 ft-lb) | 372-441 N-m (275-325 ft-lb) |

#### 12.1.1.2.4 - Maximum Wheel Fastener Torque

The wheel mounting studs used on Dexter axles conform to the SAE standards for grade 8. The maximum torque level that can be safely applied to these studs is listed in the following chart :

| Stud Size | Maximum Torque |
|---|---|
| 1/2"-20 UNF, class 2A | 162 N-m (120 ft-lb) |
| 9/16"-18 UNF, class 2A | 230 N-m (170 ft-lb) |
| 5/8"-18 UNF, class 2A | 440 N-m (325 ft-lb) |




**Exceeding the above listed torque limits can damage studs and / or nuts and lead to eventual fractures and dangerous wheel separation.**

### 12.1.2 - How to use your electric brakes properly

Your trailer brakes are designed to work in synchronization with your tow vehicle brakes. Never use your tow vehicle or trailer brakes alone to stop the combined load.

Your brake controller must be set up according to the manufacturer's recommendations to ensure proper synchronization between the tow vehicle and the trailer. Some small adjustments occasionally may be made to accommodate changing loads and driving conditions.

Proper synchronization of tow vehicle to trailer braking can only be accomplished by road testing. Brake lockup, "grabbiness", or harshness is quite often due to the lack of synchronization between the tow vehicle and toe trailer being towed, too high of a threshold voltage (over 2 volts), or under adjusted brakes.

Before any synchronization adjustments are made, your trailer brakes should be burnished-in by applying the brakes 20-30 times with approximately a 32 Km/h (20 mph) decrease in speed, e.g. 64 Km/h (40 mph) to 32 km/h (20 mph). Allow ample time for brakes to cool between applications. This allows the brake shoes and magnets to slightly "wear-in" to the drum surfaces.

**Trailer wire size chart**

| Number of brakes | Hitch-to-Axle | Recommended Minimum Hook-up Wire size (copper) |
|---|---|---|
| 2 | - | 12 AWG |
| 4 | Under 9.0 m (30 ft) | 12 AWG |
| 4 | 9.0 - 15 m (30 - 50 ft) | 10 AWG |
| 6 | Under 9.0 m (30 ft) | 10 AWG |
| 6 | 9.0 - 15 m (30 - 50 ft) | 8 AWG |

### 12.1.3 - Maintenance

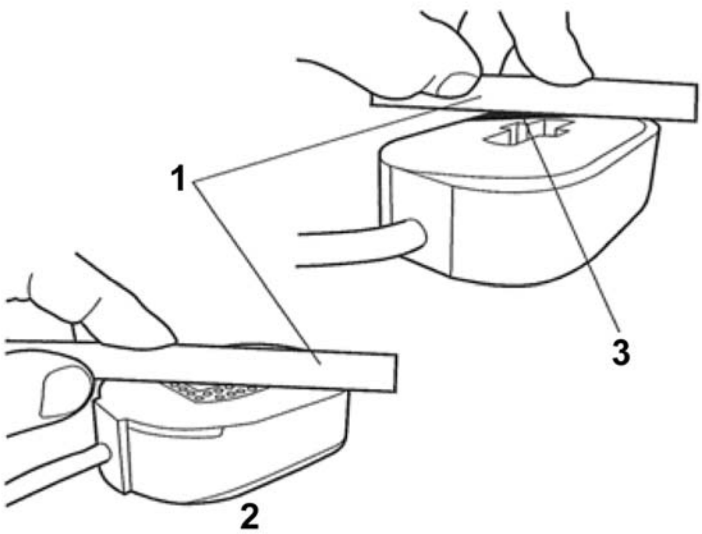
**Maintenance Schedule**

| Item | Function required | Weekly | 3 Months or 4.828 Km (3,000 miles) | 6 Months or 9.656 Km (6,000 miles) | 12 Months or 19.312 Km (12,000 miles) |
|---|---|---|---|---|---|
| Brakes | Test that they are operational. | At every use | | | |
| Brake Adjustment | Adjust to proper operating clearance. | | ● | | |
| Brake Magnets | Inspect for wear and current draw. | | | ● | |
| Brake Linings | Inspect for wear or contamination. | | | | ● |
| Brake Controller | Check for correct amperage and modulation. | | | ● | |
| Brake Cylinders | Check for leaks, sticking. | | | | ● |
| Brake Lines | Inspect for cracks, leaks, kinks. | | | | ● |
| Trailer Brake Wiring | Inspect wiring for bare spots, fray, etc. | | | | ● |
| Breakaway System | Check battery charge and switch operation. | At every use | | | |
| Hub / Drum | Inspect for abnormal wear or scoring. | | | | ● |
| Wheel Bearings and Cups | Inspect for corrosion or wear. Clean and Repack. | | | | ● |
| Seals | Inspect for Leakage. Replace if Removed. | | | | ● |
| Springs | Inspect for Wear, Loss of Arch. | | | | ● |
| Suspension Parts | Inspect for Bending, Loose Fasteners and Wear. | | | ● | |
| Hangers | Inspect Welds. | | | | ● |
| Wheel Nuts and Bolts | Tighten to Specified Torque Values. | | ● | | |
| Wheels | Inspect for Cracks, Dents, or Distortion. | | | ● | |
| Tire Inflation Pressure | Inflate Tires to Manufacturer's Specifications. | ● | | | |
| Tire Condition | Inspect for Cuts, Wear, Bulging, etc. | | ● | | |

*12.1.3.1 - Magnets*

Your electric brakes are equipped with high quality electromagnets that are designed to provide the proper input force and friction characteristics. The magnets should be inspected and replaced if worn unevenly or abnormally ( 3 ). As indicated below, a straightedge ( 1 ) should be used to check magnet condition. For best results, the magnet should be flat.

Even if wear is normal ( 2 ) as indicated by the straightedge ( 1 ), the magnets should be replaced if any part of the magnet coil has become visible through the friction material facing of the magnet. It is also recommended that the drum armature surface be refaced when replacing magnets (see section on Brake Drum Inspection). Magnets should also be replaced in pairs - both sides of an axle. Use only genuine  Dexter replacement parts when replacing your magnets.



#### *12.1.3.2 - Brake cleaning and inspection*

Your trailer brakes must be inspected and serviced immediately if a loss of performance is indicated. With normal use, servicing at one year intervals is usually adequate. With increased usage, this work should be done more frequently as required. Magnets and shoes must be changed when they become excessively worn or scored, a condition which can reduce vehicle braking.

Clean the backing plate, magnet arm, magnet, and brake shoes. Make certain that all the parts removed are replaced in the same brake and drum assembly. Inspect for any loose or worn parts, stretched or deformed springs and replace as necessary.

**POTENTIAL ASBESTOS DUST HAZARD. Some older brake linings may contain asbestos dust, which has been linked to serious or fatal illnesses. Certain precautions need to be taken when servicing brakes :**

1. Avoid creating or breathing dust.
2. Avoid machining, filing or grinding the brake linings.
3. DO NOT use compressed air or dry brushing for cleaning (dust can be removed with a damp brush).

#### *12.1.3.3 - Brake lubrication*

Before reassembling, apply a light film of grease or anti-seize compound on the brake anchor pin, the actuation arm bushing and pin, and the areas on the backing plate that are in contact with the brake shoes and magnet lever arm. Apply a light film of grease on the actuation block mounted on the actuation arm.

**DO NOT get grease or oil on the brake linings, drums or magnets.**

#### *12.1.3.4 - Shoes and Linings*

A simple visual inspection of the brake linings will tell if they are usable. Replacement is necessary if the lining is worn to 0.159 cm (1/16") or less. Shoes contaminated with grease or oil, or abnormally scored or gouged should also be replaced. Hairline heat cracks are normal in bonded linings and should not be cause for concern. When replacement is necessary, it is important to replace both shoes on each brake and both brakes of the same axle. This will help retain the "balance" on your brakes.

**POTENTIAL ASBESTOS DUST HAZARD. Some older brake linings may contain asbestos dust, which has been linked to serious or fatal illnesses. Certain precautions need to be taken when servicing brakes :**

1. Avoid creating or breathing dust.
2. Avoid machining, filing or grinding the brake linings.
3. DO NOT use compressed air or dry brushing for cleaning (dust can be removed with a damp brush).

After replacement of brake shoes and linings, the brakes must be re-burnished to seat in the new components. This should be done by applying the brakes 20 - 30 times from an initial speed of 64 km/h (40 mph), slowing the vehicle to 32 km/h (20 mph). Allow ample time for brakes to cool between applications. This procedure allows the brake shoes to seat in to the drum surface.

#### *12.1.3.5 - Hubs / Drums / Bearings*

Dexter Axle offers several types of bearing arrangements and lubrication methods :

- Dexter's standard wheel bearing configuration consists of opposed tapered roller bearing cones and cups, fitted inside of a precision machined cast hub. This method of using tapered roller bearings requires that a minimal amount of axial end play is essential to the longevity of the bearings service life. This design is typically lubricated with grease, packed into the bearings. Oil lubrication is another method which is available in some of the larger axle capacities.
- E-Z Lube® is another option chosen by some trailer manufacturers. If the axle is equipped with the Dexter E-Z Lube® feature, the bearings can be periodically lubricated without removing the hubs from the axle. This feature consists of axle spindles that have been specially drilled and assembled with grease fittings in their ends. When grease is pumped into the fitting, it is channeled to the inner bearing and then flows back to the outer bearing and eventually back out the grease cap hole.
- Nev-R-Lube™ option is the latest innovation from Dexter. Nev-R-Lube™ bearings are comprised of opposed tapered roller bearing cones sealed inside of a precision ground, one piece double cup arrangement. These bearings are designed with a small amount of axial end play. This end play is essential to the longevity of the bearings service life. They are lubricated, assembled and sealed at the factory. No further lubrication is ever needed.

Before attempting any disassembly of your Dexter axle, make sure you read and follow the instructions for the appropriate axle type.

#### *12.1.3.6 - Hub removal - Standard bearings*

Whenever the hub equipment on your axle must be removed for inspection or maintenance the following procedure should be utilized.

1. Elevate and support the trailer unit per manufacturers' instructions.

**Follow the maintenance procedures to prevent damage to important structural components. Damage to certain structural components such as wheel bearings can cause the wheel end to come off of the axle. Loss of a wheel end while the trailer is moving can cause you to lose control and lead to an accident, which can result in serious injury or death.**

2. Remove the wheel.

3. Remove the grease capo by carefully prying progressively around the flange of the cap. If the hub is an oil lube type, then the cap can be removed by unscrewing it counterclockwise while holding the hub stationary.

4. Remove the cotter pin from the spindle nut.

For E-Z Lube® axles produced after February of 2002, a new type of retainer is used. Gently pry off retainer from the nut and set aside.

5. Unscrew the spindle nut (counterclockwise) and remove the spindle washer.

6. Remove the hub from the spindle, being careful not to allow the outer bearing cone to fall out. The inner bearing cone will be retained by the seal.

7. For 3.265 Kg (7,200 lb) and 3.628 Kg (8,000 lb) axles, a hub puller may be necessary to assist in drum removal.

#### *12.1.3.7 - Brake Drum Inspection*

There are two areas of the brake drum that are subject to wear and require periodic inspection. These two areas are the drum surface where the brake shoes make contact during stopping and the armature surface where the magnet contacts (only in electric brakes).

The drum surface should be inspected for excessive wear or heavy scoring. If worn more than 0,05 cm (0.020") oversized, or the drum has worn out of round by more that 0,038 cm (0.015"), then the drum surface should be re-machined. If scoring or other wear is greater than 0,228 cm (0.090")on the diameter, the drum must be replaced.

When turning the drum surface, the maximum rebore diameter is as follows :

- 7" Brake Drum - 18,0 cm (7.090") diameter.
- 10" Brake Drum - 25,6 cm (10.090") diameter.
- 12" Brake Drum - 30,7 cm (12.090") diameter.
- 12 1/4" Brake Drum - 31,3 cm (12.340") diameter.
- 6K and 8K Rotor - 2,61 cm (1.03") minimum thickness.
- 3.5K Rotor - 2,16 cm (0.85") minimum thickness.

The machined inner surface of the brake drum that contacts the brake magnet is called the armature surface. If the armature surface is scored or worn unevenly, it should be refaced to a 120 micro inch finish by removing not more than 0,07 cm (0.030") of material. To insure proper contact between the armature face and the magnet face, the magnets should be replaced whenever the armature surface is refaced and the armature surface should be refaced whenever the magnets are replaced.

***N.B.-:-IT IS IMPORTANT TO PROTECT THE WHEEL BEARING BORES FROM METALLIC CHIPS AND CONTAMINATION WHICH RESULT FROM DRUM TURNING OR ARMATURE REFACING OPERATIONS. MAKE CERTAIN THAT THE WHEEL BEARING CAVITIES ARE CLEAN AND FREE OF CONTAMINATION BEFORE REINSTALLING BEARING AND SEALS. THE PRESENCE OF THESE CONTAMINANTS WILL CAUSE PREMATURE WHEEL BEARING FAILURE.***

### *12.1.3.8 - Bearing inspection*

Wash all grease and oil from the bearing cone using a suitable solvent. Dry the bearing with a clean, lint-free cloth and inspect each roller completely.

**Be sure to wear safety glasses when removing or installing force fitted parts. Failure to comply may result in serious eye injury.**

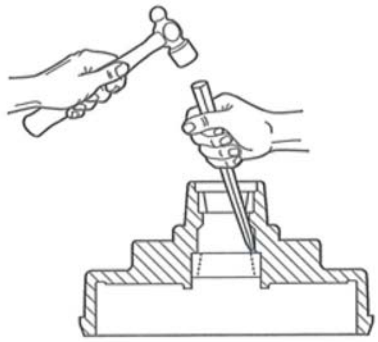
If any pitting, spalling, or corrosion is present, then the bearing must be replaced. The bearing cup inside the hub must be inspected.

IMPORTANT : Bearings must always be replaced in sets of a cone and a cup.

**NEVER spin the bearing with compressed air. This can damage the bearing.**

When replacing the bearing cup proceed as follows :

1. Place the hub on a flat work surface with the cup to be replaced on the bottom side.
2. Using a brass drift punch, carefully tap around the small diameter end of the cup to drive out.
3. After cleaning the hub bore area, replace the cup by tapping in with the brass drift punch. Be sure the cup is seated all the way against the retaining shoulder in the hub



Replace only with bearings as specified in the Bearing Replacement Chart.

### *12.1.3.9 - Bearing lubrication - Grease*

**DO NOT mix Lithium, calcium, sodium or barium complex greases due to possible compatibility problems.**

**When changing from one type of grease to another, it is necessary to insure all the old grease has been removed.**

Along with bearing adjustment, proper lubrication is essential to the proper function and reliability of your trailer axle. Bearings should be lubricated every 12 months or 19.312 Km (12,000 miles). The method to repack bearing cones is a follows :

1. Place a quantity of grease into the palm of your hand.
2. Press a section of the widest end of the bearing into the outer edge of the grease pile closest to the thumb forcing grease into the interior of the bearing.
3. Repeat this while rotating the bearing from roller to roller.
4. Continue this process until you have the entire bearing completely filled with grease.
5. Before reinstalling, apply a light coat of grease on the bearing cup.

### *12.1.3.10 - Bearing Lubrication - Oil*

If your axles are equipped with oil lubricated hubs, periodically check and refill the hub as necessary with a high quality hypoid gear oil to the level indicated on the clear plastic oil cap. The oil can be filled from either the oil fill hole, if present, in the hub or through the rubber plug hole in the cap itself.



**Recommended Wheel Bearing Lubrication Specification**

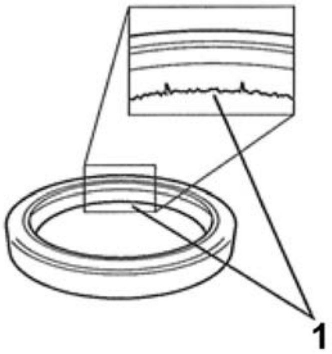
| Grease | |
|---|---|
| Thicker Type | Lithium Complex |
| Dropping Point | 215°C (419°F) minimum |
| Consistency | NLGI No. 2 |
| Additives | EP, Corrosion & Oxidation Inhibitors |
| Viscosity Index | 80 minimum |
| **Approved Grease Sources** | |
| ConocoPhillips / 76 Lubricants / Kendall | Multiplex RED #2<br>L427 Super Blu Grease |
| Citgo | Lithoplex MP #2<br>Lithoplex CM #2<br>Mystik JT-6 Hi-Temp Grease #2 |
| Exxon / Mobil Company | Ronex, MP<br>Mobilith AW 2<br>Mobil I Synthetic Grease |
| Oil Center Research of Oklahoma | Liquid-O-Ring No. 167L |
| Pennzoil-Quaker State Company | Synthetic Red Grease |
| Shell | ALBIDA EP 2<br>ALBIDA Grease SLC 220<br>Rotella Heavy Duty Lithium Complex #2 |
| Royal Manufacturing Company | Royal 98 Lithium Complex EP #2 |
| Chevron Texaco | Chevron Ulti-Plex Grease EP #2<br>Texaco Starplex Moly MPGM #2 |
| Valvoline | Valvoline Multi-Purpose GM<br>Valvoline Durablend |
| Great Plans Lubricants | Lithium Complex EP #2 |
| Chem Arrow | Arrow 2282 |
| **Oil** | |
| SAE 90, SAE 80W-90, SAE 75W-90 | |

| Approved Oil Sources | |
|---|---|
| Ashland Oil | Valvoline Durablend<br>Valvoline Power Lube |
| CITGO Petroleum Company | CITGO Premium Gear Oil MP<br>Mystik JT-7<br>Mystik Power Lube |
| Exxon Company USA | Gear Oil GX 80W-90 |
| Industrial Oils Unlimited | Super MP Gear Oil 80W90 |
| Kendall Refining Company | Kendall NS-MP Hypoid Gear Lube |
| Lubriplate Division / Fiske Brothers Refining | Lubriplate APG 90 |
| Mobile Oil Corporation | Mobilube SHC<br>Mobile 1 Synthetic Gear Lube |
| Phillips 66 Petroleum | Super Multi-Purpose Gear Oil<br>Philguard Gear Oil<br>Philsyn Gear Oil |
| Pennzoil Products Company | Gear Plus 80W-90 GL-5<br>Gear Plus Super 75W-90<br>Gear Plus Super EW 80W-90<br>Multi-Purpose 4092 Gear Lube |
| Oil Center Research | Liquid-O-Ring 750 GX |
| Sun Refining and Marketing Company | Sonoco Ultra<br>Sonoco Dura Gear |
| Shell Oil Company | Spirax A<br>Spirax G<br>Spirax HD<br>Spirax S |
| Texaco Oil Company | Multigear EP<br>Multigear SS |
| Troco Division / Royal Manufacturing | Multigear Select Gear Oil |
| Union Oil Company | Unocal MP Gear Lube<br>76 Triton Syn Lube EP |

***N.B.-:-THE CONVENIENT LUBRICATION PROVISIONS OF THE E-Z LUBE® AND THE OIL LUBRICATION MUST NOT REPLACE PERIODIC INSPECTION OF THE BEARINGS.***

#### 12.1.3.11 - Seal inspection and replacement

Whenever the hub is removed; inspect the seal to assure that it is not kicked or torn ( 1 ) and is still capable of properly sealing the bearing cavity. If there is any question of condition, replace the seal. Use only the seals specified in the Seal Replacement Chart.




To replace the seal :

1. Pry the seal out of the hub with a screwdriver. Never drive the seal out with the inner bearing as you may damage the bearing.

2. Apply a PERMATEX sealant to the outside of the new seal.

***N.B.-:-PERMATEX SEALANT SHOULD NOT BE USED ON RUBBER ENCASED SEALS.***

3. Tap the new seal into place using a clean wood block.



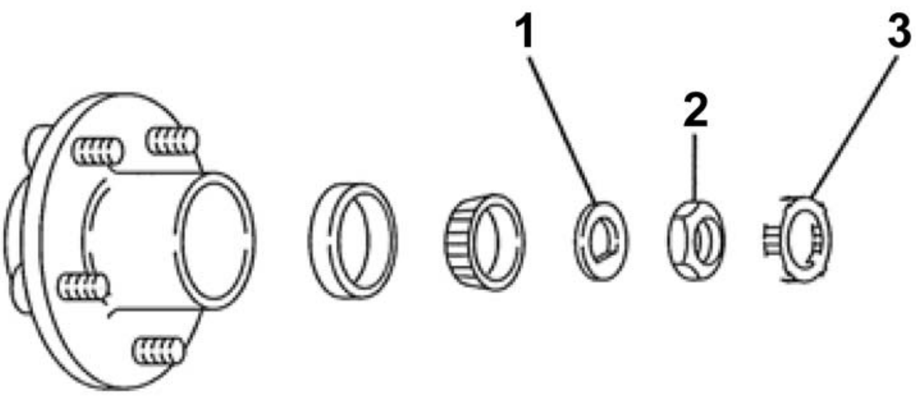
### *12.1.3.12 - Bearing adjustment and hub replacement*

If the hub has been removed or bearing adjustment is required, the following adjustment procedure must be followed :

1. After placing the hub bearings, washers, and spindle nut back on the axle spindle in reverse order as detailed in the previous section on hub removal, rotate the hub assembly slowly while tightening the spindle nut to approximately 68 N-m (50 ft-lb), (30 cm (12") wrench or pliers with full hand force.).
2. Then loosen the spindle nut to remove the torque. DO NOT rotate the hub.
3. Finger-tighten the spindle nut until just snug.
4. Back the spindle nut out slightly until the first castellation lines up with the cotter key hole and insert the cotter pin.
5. Bend over the cotter pin legs to secure the nut.
6. Nut should be free to move with only restraint being the cotter pin.

#### 12.1.3.12.1 - For E-Z Lube® axles using the new nut retainer

**Typical E-Z Lube® After Spring 2002**




After placing the hub, bearings, washers ( 1 ) and spindle nut back on the axle spindle in reverse order as detailed in the previous section on hub removal, rotate the hub assembly slowly while tightening the spindle nut to approximately 68 N-m (50 ft-lb), (30 cm (12") wrench or pliers with full hand force.).

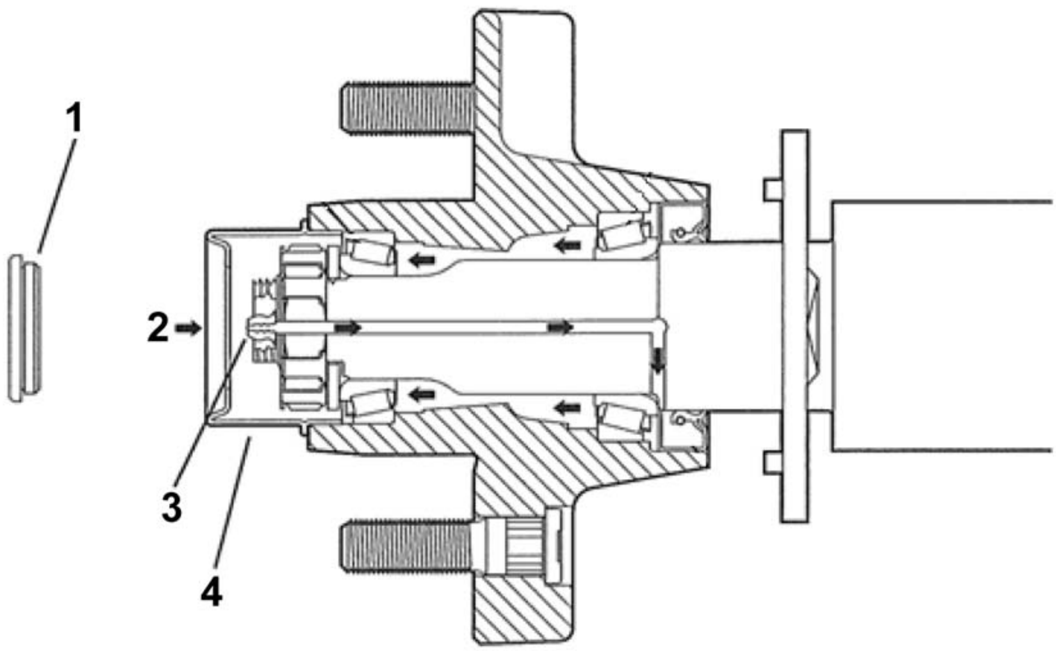
Then loosen the spindle nut to remove the torque. DO NOT rotate the hub.

Finger-tighten the spindle nut until just snug; align the retainer ( 3 ) to the machined flat on the spindle and press the retainer onto the nut ( 2 ). The retainer ( 3 ) should snap into place. Once in place, the retainer / nut assembly should be free to move slightly.

If the nut ( 2 ) is too tight, remove the retainer ( 3 ) and back the nut off approximately one twelfth of a turn and reinstall the retainer ( 3 ). The nut ( 2 ) should now be free to move slightly.

Reinstall grease cap.

### 12.1.3.12.2 - E-Z LUBE® lubrication




**The Procedure is as follows :**

Remove the rubber plug ( 1 ) from the end of the grease cap ( 4 ).

Place a standard grease gun into the grease fitting ( 3 ) located in the end of the spindle. Make sure the grease gun nozzle is fully engaged on the fitting.

Pump grease into the fitting. The old displaced grease will begin to flow back ( 2 ) out the cap around the grease gun nozzle.

As seen the new clean grease, remove the grease gun, wipe off any excess, and replace the rubber lug in the cap.

Rotate hub or drum while adding grease.

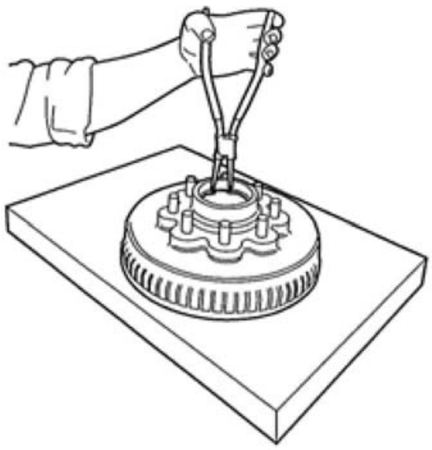
***N.B.-:-THE E-Z LUBE® FEATURE IS DESIGNED TO ALLOW IMMERSION IN WATER. AXLES NOT EQUIPPED WITH E-Z LUBE® ARE NOT DESIGNED FOR IMMERSION AND BEARINGS SHOULD BE REPACKED AFTER EACH IMMERSION. IF HUBS ARE REMOVED FROM AN AXLE WITH THE E-Z LUBE® FEATURE, IT IS IMPERATIVE THAT THE SEALS BE REPLACED BEFORE BEARING LUBRICATION. OTHERWISE, THE CHANCE OF GREASE GETTING ON BRAKE LININGS IS GREATLY INCREASED.***

***12.1.3.13 - Bearing replacement and drum installation***

1. Once the drum and bearing assembly is removed from the axle, remove internal snap ring from the bearing bore that retains bearing.

2. Using an arbor press and mandrel, press the bearing out of the drum. Bearing will exit on the wheel side of the drum.

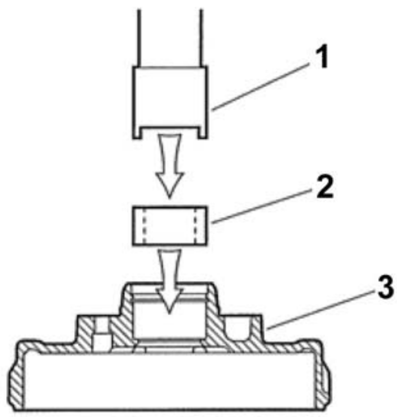
3. When replacing a Nev-R-Lube™ bearing pack, the bore in the hub should be cleaned and inspected for visual damage (replace as necessary).



4. Install the new bearing ( 2 ) using an arbor press ( 1 ) fitted with a hollow or stepped punch face to press only on the outer housing of the bearing. Failure to follow procedure will damage the bearing and / or seals during installation. Press bearing ( 2 ) until it seats against the backup shoulder machined into the hub ( 3 ).

5. Install internal snap ring into hub.

6. Clean and inspect spindle shaft. Apply a light coating of anti-seize lubricant to the spindle shaft prior to assembling drum.




7. Install drum assembly onto spindle (DO NOT Force).

8. Install steel washer into spindle end.

9. Start self-locking nut into spindle thread by hand. Complete installation using a 1 1/2" or 1 7/16" socket and torque wrench. Nut should be torqued to 196 - 210 N-m (145 - 155 ft-lb). (This torque will set the internal bearing adjustment; no other adjustments are to be made. )

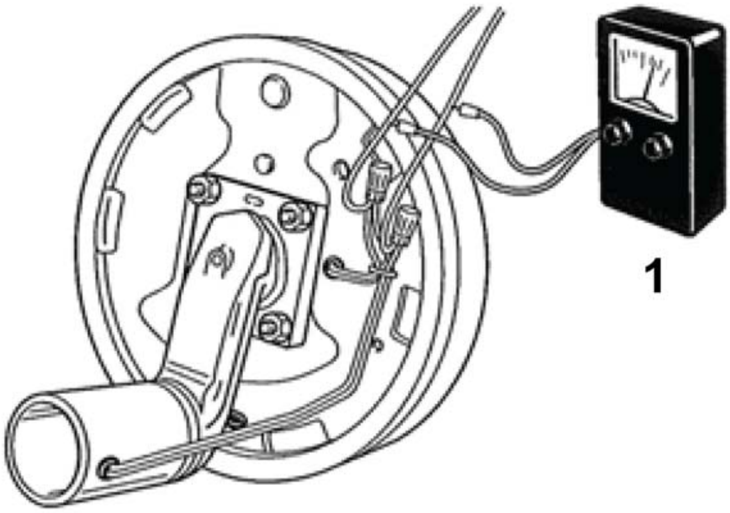
10. Install "torque instruction" washer onto end of spindle.

11. Install "external" snap ring onto end of spindle to retain washer.

12. Inspect assembly for excessive end play, noise, and rotation restriction prior to mounting final wheel end hardware.

***12.1.3.14 - How to measure voltage***

System voltage is measured at the magnets by connecting the voltmeter ( 1 ) to the two magnet lead wires at any brake. This may be accomplished by using a pin probe inserted through the insulation of wires. The engine of the towing vehicle should be running when checking the voltage so that a low battery will not affect the readings.




Voltage in the system should begin at 0 volts and, as the controller bar is slowly actuated should gradually increase to about 12 volts. If the controller does not produce this voltage control, consult your controller manual.

The threshold voltage of a controller is the voltage applied to the brakes when the controller first turns on. Lower threshold voltage will provide for smoother braking. If the threshold voltage is too high, the brakes may feel grabby and harsh.

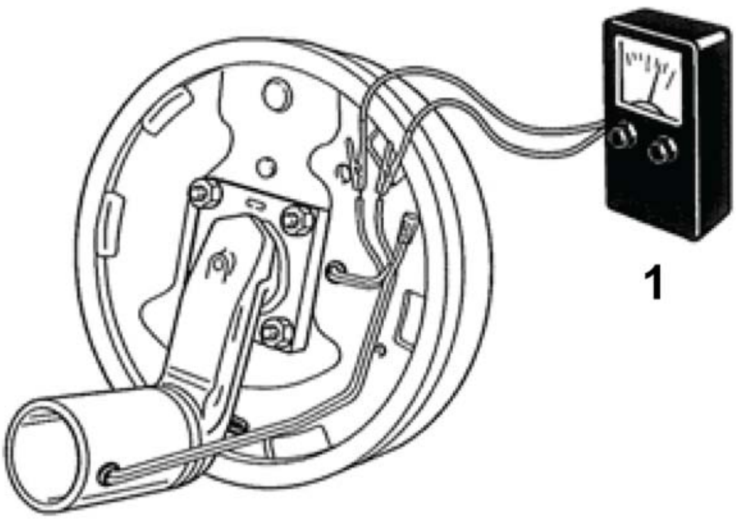
### *12.1.3.15 - How to measure amperage*

System amperage is the current flowing in the system when all the magnets are energized. The amperage will vary in proportion to the voltage. The engine of the tow vehicle should be running with the trailer connected when checking the trailer braking system.

One place to measure system amperage is at the BLUE wire of the controller, which is the output to the brakes. The BLUE wire must be disconnected and the ammeter ( 1 ) put in series into the line. System amperage draw should be as noted in the following table. Make sure your ammeter has sufficient capacity and note polarity to prevent damaging your ammeter.

**Magnet amperes chart**

| Brake size | Amps / Magnet | 2 brakes | 4 brakes | 6 brakes | Magnet / Ohms |
|---|---|---|---|---|---|
| 7" x 1 1/4" | 2.5 | 5.0 | 10.0 | 15.0 | 3.9 |
| 10" x 1 1/2" | 3.0 | 6.0 | 12.0 | 18.0 | 3.2 |
| 10" x 2 1/4" | 3.0 | 6.0 | 12.0 | 18.0 | 3.2 |
| 12" x 2" | 3.0 | 6.0 | 12.0 | 18.0 | 3.2 |
| 12" x 2 1/2" | 3.0 | 6.0 | 12.0 | 18.0 | 3.2 |
| 12" x 3 3/8" | 3.0 | 6.0 | 12.0 | 18.0 | 3.2 |




If a resistor is used in the brake system, it must be set at zero or bypassed completely to obtain the maximum amperage reading. Individual amperage draw can be measured by inserting the ammeter ( 1 ) in the line at the magnet you want to check.

Disconnect one of the magnet lead wire connectors and attach the ammeter between the two wires. Make sure that the wires are properly reconnected and sealed after testing is competed.

The most common electrical problem is low or no voltage and amperage at the brakes. Common causes of this condition are :

1. Poor electrical connections
2. Open circuits
3. Insufficient wire size
4. Broken wires
5. Blown fused (fusing of brakes is not recommended)
6. Improperly functioning controllers or resistors.

Another common electrical problem is shorted or partially shorted circuits (indicated by abnormally high system amperage). Possible causes are :

7. Shorted magnet coils
8. Defective controllers
9. Bare wires contacting a grounded object.

Finding the cause of a short circuit in the system is done by isolating one section at a time. If the high amperage reading drops to zero by unplugging the trailer, then the short is in the trailer. If the amperage reading remains high with all the brake magnets disconnected, the short is in the trailer wiring.

All electrical trouble shooting procedures should start at the controller. Most complaints regarding brake harshness or malfunction are traceable to improperly adjusted or non-functioning controllers. See your controller manufacturer's data for proper adjustment and testing procedures. For best results, all the connection points in the brake wiring should be sealed to prevent corrosion. Loose or corroded connectors will cause an increase in resistance which reduces the voltage available for the brake magnets.

## 12.1.4 - Storage

### *12.1.4.1 - Storage preparation*

If your trailer has been stored for an extended period of time or over the winter, it is important that the trailer be prepared properly.

1. Remove the emergency breakaway battery and store inside, out of the weather. Charge the battery at lease every 90 days.

2. Jack up the trailer and place jack stands under the trailer frame so that the weight will be off the tires. Follow trailer manufacturer's guidelines to lift and support the unit. Never jack up or place jack stands on the axle tube or on the equalizers.

**DO NOT lift or support the trailer on any part of the axle or suspension system. NEVER go under any trailer unless it is properly supported on jack stands which have been rated for the load. Improperly supported vehicles can fall unexpectedly and can cause serious injury or death.**

3. Lubricate mechanical moving parts such as the hitch, and suspension parts, that are exposed to the weather.

4. Boat trailer axles are subject to repeated immersion. Before storing, remove brake drums; clean, dry and re-lubricate moving brake components; inspect bearings - clean and re-lubricate.

5. On oil lubricated hubs, the upper part of the roller bearings are not immersed in oil and are subject to potential corrosion. For maximum bearing life, it is recommended that you revolve your wheels periodically (every 2 - 3 weeks) during periods of prolonged storage.

### *12.1.4.2 - After prolonged storage inspection procedure*

Before removing trailer from jack stands :

1. Remove all wheels and hubs or brake drums. Note which spindle and brake that the drum was removed from so that it can be reinstalled in the same location.

2. Inspect suspension for wear.

3. Check tightness of hanger bolt, shackle bolt, and U-bolt nuts per recommended torque values.

4. Check brake linings, brake drums and armature faces for excessive wear or scoring.

5. Check brake magnets with an ohmmeter. The magnets should check 3.2 ohms. If shorted or worn excessively, they must be replaced.

6. Lubricate all brake moving parts using a high temperature brake lubricant (LUBRIPLATE or Equivalent).

**DO NOT get grease or oil on brake linings or magnet face.**

7. Remove any rust from braking surface and armature surface of drums with fine emery paper or crocus cloth. Protect bearings from contamination while so doing.

8. Inspect oil or grease seals for wear or nicks. Replace if necessary.

9. Lubricate hub bearings. Refer to procedure in this manual.

10. Reinstall hubs and adjust bearings per instructions in this manual.

11. Mount and tighten wheels per instructions in this manual.

#### *12.1.4.3 - Trip preparation checklist*

There are a number of simple rules to follow in caring for your trailer axle assembly that can add to its life and in the case some of these rules; you may be protecting your own life as well.

Using the following checklist before starting a trip with your trailer is highly recommended. Some of these items should be checked 2 - 3 weeks prior to a planned trip to allow sufficient time to perform maintenance.

1. Check your maintenance schedule and be sure you are up-to-date.
2. Check hitch. Is it showing wear ?Is it properly lubricated?
3. Fasten safety chains and breakaway switch actuating chain securely. Make certain the breakaway battery is fully charged
4. Inspect towing hookup for secure attachment.
5. Load your trailer so that approximately 10% of the trailers total weight is on the hitch. For light trailers this should be increased to 15%.
6. DO NOT OVERLOAD. Stay within your gross vehicle rated capacity (consult your trailers identification plate).
7. Inflate tires according to manufacturer's specifications; inspect tires for cuts, excessive wear, etc.
8. Check wheel mounting nuts / bolts with a torque wrench. Torque in proper sequence, to the levels specified in this manual.
9. Make certain the brakes are synchronized and functioning properly.
10. Check tightness of hanger bolt, shackle bolt, and U-bolts nuts per torque values specified in this manual.
11. Check operation of all lights.
12. Check that your trailer is towing in a level position and adjust hitch height if required.

## 12.1.5 - Troubleshooting

### *12.1.5.1 - Introduction to troubleshooting - Hydraulic braking system*

Proper brake function is critical to the safe operation of any vehicle. A properly installed vacuum / hydraulic, air / hydraulic system should not require any special attention with the exception of routine maintenance as defined by the manufacturer. If problems occur, the entire tow vehicle / trailer braking system should be analyzed by a qualified mechanic. Typical problems in a hydraulic braking system are :

- Air or vacuum leaks
- Hydraulic system leaks
- Air in brakes lines
- Water or other impurity in brake fluid
- Rusted or corroded master or wheel cylinders
- Actuation system malfunction.

Consult the following trouble shooting chart to determine the causes and solutions for common problems found in trailer braking systems.

**The operation pressure required for Dexter brakes :**

- **7" diameter drum brakes - Maximum operating pressure is 52 bar (750 psi)**
- **10" diameter and larger drum brakes - Maximum operating pressure is 69 bar (1,000 psi)**
- **Hydraulic disc brakes (all sizes) - Maximum operating pressure is 110 bar (1,600 psi)**

## Troubleshooting - Hydraulic braking system

| Symptom | Causes | Remedies |
|---|---|---|
| No brakes | Broken or Kinked Brake Line | Repair or replace |
| | Severe Under Adjustment | Adjust Brakes |
| | Malfunctioning Actuation System | Troubleshoot System |
| Weak Brakes | Brake Adjustment Not Correct | Manual - Adjust Brakes<br>Automatic - Make Several Reverse Stops |
| | Excessively Worn Brake Linings | Replace Shoe and Lining |
| | Incorrect Lining | Install Correct Shoe and Lining |
| | Grease or Fluid Soaked Lining | Repair Grease Seal or Wheel Cylinder. Install New Shoe and Lining |
| | Frozen Master Cylinder or Wheel Cylinder Pistons | Recondition or Replace All Cylinders, Brake Fluid |
| | Glazed Lining | Re-burnish or Replace |
| | Excessive Drum Wear | Replace |
| | Trapped Air in Lines | Bleed System |
| | Overloaded Trailer | Correct |
| | Malfunctioning Actuation System | Troubleshoot System |
| Harsh Brakes | Brake Adjustment Not Correct | Manual - Adjust Brakes<br>Automatic - Make Several Reverse Stops |
| | Grease or Fluid on Linings | Replace Shoes and Lining |
| Surging Brakes | Grease or Oil on Linings | Clean or Replace |
| | Out of Round Drums or Cracked Drums | Machine or Replace |
| Noisy Brakes | Under Adjustment | Adjust |
| | Lack of Lubrication | Lubricate |
| | Broken Brake Components | Replace Components |
| | Incorrect Brake Components | Correct |
| Locking Brakes | Loose, Bent or Broken Brake Components | Replace Components |
| | Under Adjustment | Adjust |
| | Out of Round Drums | Machine or Replace |
| Pulls to One Side | Incorrect Tire Pressure | Inflate Evenly on Both Sides to Required Pressures |
| | Unmatched Tires on Same Axle | Match Tires on Axle |
| | Restricted Brake Lines or Hoses | Repair or replace |
| | Malfunctioning Cylinder Assembly | Check for Stuck or Sluggish Pistons |
| | Defective or Damaged Shoe and Lining | Install New Shoe and Lining - Complete Axle |
| | One Side Out of Adjustment | Adjust |
| Dragging | Improper Fluid | Replace Rubber Parts - Fill with DOT4 Fluid |
| | Blocked Master Cylinder | Open with Compressed Air or Replace Cylinder |
| | Parking Brake Cable Frozen | Free Cable and Lubricate |
| | Improper Lining Thickness or Location | Install New Shoe and Lining |

### *12.1.5.2 - Introduction to troubleshooting - Electric braking system*

Proper brake function is critical to the safe operation of any vehicle. If problems are encountered with your trailer braking system, the following guide can be used to find the causes and remedies for some of the more common problems. In the inability to resolve the problem, contact the nearest repair facility for professional assistance.

#### 12.1.5.2.1 - Troubleshooting

Most electric brake malfunctions that cannot be corrected by either brake adjustments, or synchronization adjustments, can generally be traced to electrical system failure. Voltmeters and ammeters are essential tools for proper troubleshoot of electric brakes.

Mechanical causes are ordinarily obvious, i.e. bent or broken parts, worn out linings or magnets, seized lever arts or shoes, scored drums, loose parts, etc. Replace defective parts with genuine Dexter replacements.

Consult the following troubleshooting chart to determine the causes and solutions for common problems found in trailer braking systems.

**Best braking performance is achieved with a controller setting that is just short of wheel lock up or slide. Overly aggressive braking, which results in wheel lock up and sliding, can cause a dangerous loss of control and result in personal injury or death.**

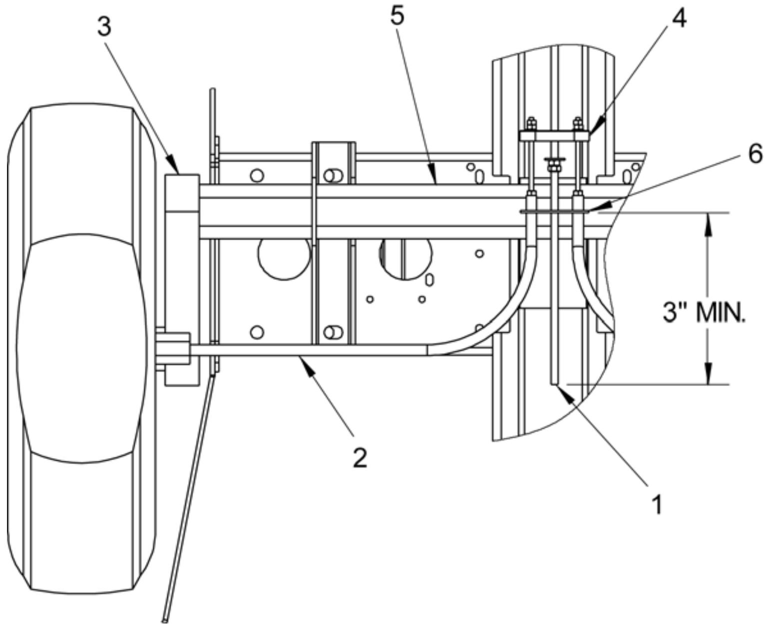
## Troubleshooting - Electric braking system

| Symptom | Causes | Remedies |
|---|---|---|
| No brakes | Open circuits | Find and Correct |
| | Severe Under Adjustment | Adjust Brakes |
| | Faulty Controller | Test and Correct |
| | Short Circuits | Find and Correct |
| Weak Brakes | Grease or Oil on Magnets or Linings | Clean or Replace |
| | Corroded Connections | Clean and Correct Cause of Corrosion |
| | Worn Linings or Magnets | Replace |
| | Scored or Grooved Brake Drums | Machine or Replace |
| | Improper Synchronization | Correct |
| | Under Adjustment | Adjust Brakes |
| | Glazed Linings | Re-burnish or Replace |
| | Overloaded Trailer | Correct |
| Locking Brakes | Under Adjustment | Adjust |
| | Improper Synchronization | Correct |
| | Faulty Controller | Test and Correct |
| | Loose, Bent or Broken Brake Components | Replace Components |
| | Out of Round Brake Drums | Machine or Replace |
| | Insufficient Wheel Load | Adjust System Resistor and Synchronize |
| Intermittent Brakes | Faulty Controller | Test and Correct |
| | Broken wires | Repair or Replace |
| | Loose Connections | Find and Repair |
| | Faulty Ground | Find and Repair |
| Brakes Pull to One Side | Wrong Magnet Lead Wire Color | Correct |
| | Incorrect Adjustment | Adjust |
| | Grease or Oil on Magnets or Linings | Clean or Replace |
| | Broken Wires | Find and Repair |
| | Bad Connections | Find and Repair |
| Harsh Brakes | Under Adjustment | Adjust |
| | Improper Synchronization | Correct |
| | Improper Controller | Change |
| | Faulty Controller | Test and Correct |
| Noisy Brakes | Under Adjustment | Adjust |
| | Lack of Lubrication | Lubricate |
| | Broken Brake Components | Replace Components |
| | Incorrect Brake Components | Correct |
| Surging Brakes | Grease or Oil on Magnets or Linings | Clean or Replace |
| | Out of Round Drums or Cracked Brake Drums | Machine or Replace |
| | Faulty Controller | Test and Correct |
| Dragging | Over Adjustment | Re-Adjust |
| | Out of Round Brake Drums | Machine or Replace |
| | Incorrect Brake Components | Replace |
| | Loose, Bent or Broken Brake Components | Replace |
| | Faulty Brake away Switch | Repair or Replace |
| | Loose Wheel Bearing Adjustment | Adjust |
| | Bent Spindle | Replace Axle |

## 12.2 - Bradley Brake Adjustment

### 12.2.1 - Aerial work platforms with standard brakes

**Standard brake adjustment procedure**




1. All brake adjustments must be done with the aerial work platform's wheels off the ground, with the ROD ( 1 ) and BRAKE CABLES ( 2 ) completely slack (no tension).

2. Locate the BRAKE ADJUSTER NUT (not shown) on the rear of the BRAKE BACKER PLATE (3).

3. While rotating the wheel in the forwards direction, turn the ADJUSTER NUT clockwise (CW) until the wheel locks, (this centralizes the shoes in the drum).

***N.B.-:-Never turn the wheel in the opposite direction for this adjustment.***

4. Loosen, or "back off" the ADJUSTER NUT, by turning the nut counter clockwise (CCW) while rotating the wheel in the forward direction; turn the nut until there is a slight rubbing of the shoes on the drum.

5. Repeat steps 2-4 to adjust the other BRAKE.

6. Confirm that the BRAKE CABLES ( 2 ) are attached at both ends. Each cable has two threaded ends, a dished washer and two nuts, fitted to each cable stud and locked together. Check the end that is connected inside the brake hub first. Next confirm that the BALANCE BAR ( 4 ) is parallel to the AXLE BODY ( 5 ), then check the other end of the BRAKE CABLE ( 2 ), it should pass through the CABLE STOP ( 6 ), and be secured with a nut, the cable then passes through the BALANCE BAR ( 4 ) and is secured with a M6 washer (0096-0104) and two M8 nuts (0096-0149) for locking.

***N.B.-:-The washer and nuts must be on the front side of the balance bar (4).***

# D-Maintenance

7. Confirm that the M10 x 1.5 x 82" (A-03677) fully THREADED ROD (BRAKE ROD) ( 1 ), passes through the center hole of the BALANCE BAR ( 4 ) and CABLE STOP ( 6 ), and has approximately three inches ( 3" ) of the rod behind the CABLE STOP ( 6 ). Check that the two (2) M10 nuts (0096-0114) and the dish washer are assembled between the BALANCE BAR ( 4 ) and CABLE STOP ( 6 ) (This ensures that the rod will not be pulled through and become unsupported).

8. Verify that the rod's front end is connected at the COUPLER, through the CLEVIS PIN, and secured with a M10 lock nut. The rod should not protrude more than 5/8" past the lock nut.

***N.B.-:-DO NOT TAKE THE SLACK OUT OF THE ROD AT THIS END.***

***N.B.-:-IF EITHER THE COUPLER OR THE M10 X 1.5 X 32" ROD NEEDS TO BE REPLACED THIS STEP NEEDS TO BE PERFORMED.***

9. Remove the slack out of the ROD ASSEMBLY using the M10 nuts (0096-0114) at the BALANCE BAR (4). A minimum 1/8" gap should be left between the nose of the brake link and the rear of the drawbar. If the BRAKE LEVER is difficult to pull over center to the point where the SPRING becomes operable increase the gap to 3/8" maximum.

10. Remove the "U" clip in the coupler spring and operate lever two or three times adjusting the nuts on the rod at the BALANCE BAR each time to take up slack in CABLES. Make sure the gap from step 9 is maintained.

11. Once the slack and stretch is resolved, lock the system off by ensuring all nuts and washers are present and secured.

12. With the parking brake on, rotate the wheels in the reverse direction, this will cause brake "run off" to occur. Both wheels need to be rotated in the reverse direction to properly set the run away brakes. At this point the brakes will lock up the wheels.

13. Disengage the brakes, if the brakes need to be re-adjusted, repeat step 10.

14. The brakes are now ready for the 13 percent Grade Test.

#### *12.2.1.1 - Thirteen percent (13%) grade test*

With the trailer on flat level ground, that is dry and free of ice, perform the following steps to test the brakes.

1. Start by applying the handbrake.

2. Attach a chain to the "chain anchor point", located at the rear of the aerial work platform.

3. Attach a Force Measuring Device (Load Cell) to the end of the chain.

4. The opposite end of the Load Cell needs to be attached to a fork lift, or a vehicle that can pull the aerial work platform.

***N.B.-:-ENSURE THAT THE CHAIN PULLS LEVEL TO GROUND.***

5. Start to pull the aerial work platform backwards; the boom will move a small amount, the coupler handle (brake lever) may "rock" backwards this signifies that the brakes have locked.

6. Read the load reached on the Load Cell when the wheels begin to rotate.

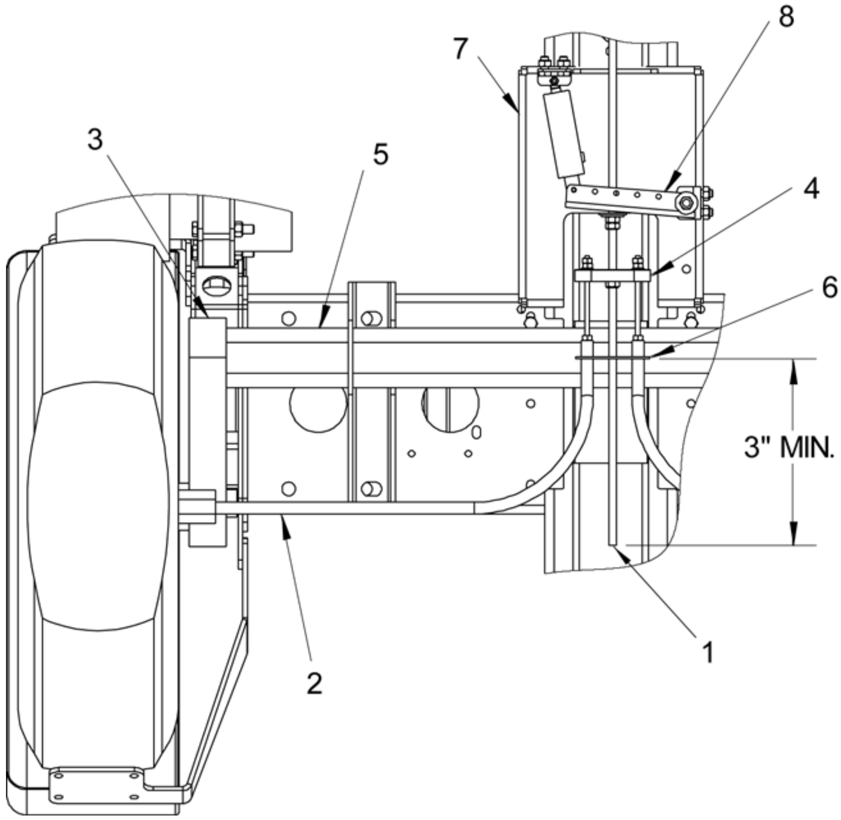
***N.B.-:-THE PEAK FEATURE OF THE LOAD CELL CAN BE USE TO GET THE HIGHEST LOAD THAT WAS REACHED DURING THE TESTING.***

7. The load reading needs to be 13% of the GVW (gross vehicle weight), for example 2000kg × 0.13 = 260 kg.

***N.B.-:-BEARING IN MIND THAT WITH VIRGIN SHOES AND DRUMS IF YOU ARE 10% BELOW THIS FIGURE IT WILL NOT BE A PROBLEM AS THE SYSTEM WILL BECOME MORE EFFICIENT AS THE BRAKES "BED IN".***

### 12.2.2 - Aerial work platforms with drive and set brakes

**Drive and set brake adjustment procedure**




1. All brake adjustments must be done with the aerial work platform's wheels off the ground, with the ROD ( 1 ) and BRAKE CABLES ( 2 ) completely slack (no tension).

2. Locate the BRAKE ADJUSTER NUT (not shown) on the rear of the BRAKE BACKER PLATE (3).

3. While rotating the wheel in the forwards direction, turn the ADJUSTER NUT clockwise (CW) until the wheel locks, (this centralizes the shoes in the drum).

***N.B.-:-NEVER TURN THE WHEEL IN THE OPPOSITE DIRECTION FOR THIS ADJUSTMENT.***

4. Loosen, or "back off" the ADJUSTER NUT, by turning the nut counter clockwise (CCW) while rotating the wheel in the forward direction; turn the nut until there is a slight rubbing of the shoes on the drum.

5. Repeat steps 2-4 to adjust the other BRAKE.

6. Confirm that the BRAKE CABLES ( 2 ) are attached at both ends. Each cable has two threaded ends, a dished washer and two nuts, fitted to each cable stud and locked together. Check the end that is connected inside the brake hub first. Next confirm that the BALANCE BAR ( 4 ) is parallel to the AXLE BODY ( 5 ), then check the other end of the BRAKE CABLE ( 2 ), it should pass through the CABLE STOP ( 6 ), and be secured with a nut, the cable then passes through the BALANCE BAR ( 4 ) and is secured with a M8 washer (0096-0104) and two M8 nuts (0096-0149) for locking.

***N.B.-:-THE WASHER AND NUTS MUST BE ON THE FRONT SIDE OF THE BALANCE BAR (4).***

7. Confirm that the M10 x 1.5 x 32" (A-03677) fully THREADED ROD (BRAKE ROD) ( 1 ), passes through the slots of the CABLE BRAKE MOUNT ( 7 ) and BRAKE RELEASE BRACKET ( 8 ), then through the center holes of the BALANCE BAR ( 4 ) and CABLE STOP ( 6 ), and has approximately three inches (3") of the rod behind the CABLE STOP ( 6 ). Check that the two (2) M10 nuts (0096-0114) and the dish washer are assembled between the BALANCE BAR ( 4 ) and CABLE STOP ( 6 ) (This ensures that the rod will not be pulled through and become unsupported). Check that (2) M12 large O.D. washers (0096-0046) , (1) M10 large O.D. washer (0096-0093) and (2) M10 nuts (0096-0041) are placed between the BALANCE BAR ( 4 ) and the BRAKE RELEASE BRACKET ( 8 ).

***N.B.-:-MAKE SURE THAT THE WASHER AND NUTS BETWEEN THE BALANCE BAR ( 4 ) AND THE BRAKE RELEASE BRACKET ( 8 ), DO NOT INTERFERE WITH THE MOVEMENT OF THE THREADED ROD ( 1 ).***

8. Verify that the rod's front end is connected at the COUPLER, through the CLEVIS PIN, and secured with a M10 lock nut. The rod should not protrude more than 5/8" past the lock nut.

***N.B.-:-DO NOT TAKE THE SLACK OUT OF THE ROD AT THIS END.***

***N.B.-:-IF EITHER THE COUPLER OR THE M10 X 1.5 X 32" ROD NEEDS TO BE REPLACED THIS STEP NEEDS TO BE PERFORMED.***

9. Remove the slack out of the ROD ASSEMBLY using the M10 nuts (0096-0114) at the BALANCE BAR (4). A minimum 1/8" gap should be left between the nose of the brake link and the rear of the drawbar. If the BRAKE LEVER is difficult to pull over center to the point where the SPRING becomes operable increase the gap to 3/8" maximum.

10. Remove the "U" clip in the coupler spring and operate lever two or three times adjusting the nuts on the rod at the BALANCE BAR each time to take up slack in CABLES. Make sure the gap from # 9 is maintained.

11. With the brakes in the "roll off" position (rod at the maximum travel position forward), the ( 2 ) washers and nuts can now be moved up behind the BRAKE RELEASE BRACKET (8) The distance between washer and bracket must be set as a constant, so that the brake handle can reapply the brake when the bracket is released during drive functions, the washer must not interfere with rod movement forward for "roll off" breaking. After correct adjustment has been made the washer positioning nut can be locked in place.

If the brake rods are adjusted at this point forward and / or reverse the washers and nuts will also need to be readjusted.

#### *12.2.2.1 - Troubleshooting the bradley running gear*

1. When the brake lever is on and the vehicle is reversed, if and when both brakes have rolled off and the brake lever has re-applied the brake. The cable balance bar is not parallel to the axle body then one of the brakes is set higher than the other and cannot back off. Adjustment of the brake cables is then required.
2. Always re-adjust the side which has seen the least amount of movement. If the other side has rolled off and cannot be rotated in the reverse direction any further.
3. If the balance bar pulls unevenly in reverse and neither side lock up after roll off then start again with #4 of brake adjustment section. This can also be said for an uneven balance bar in the forward direction.
4. If the brakes are too high the brakes will have difficulty in collapsing into reverse mode.

# 13 - Cylinder replacement

## 13.1 - DESCRIPTION

Remove cylinder to replace cylinder seals.

This operation implies that its user is trained on this kind of machine and that this training was delivered by HAULOTTE® or an authorised representative(Training program DIAG LEVEL II).

It is important that the person performing the work on the machine knows all the relative safety information contained in the instruction manual.

**Only an authorized and qualified technician can work on HAULOTTE® machines.**

- Number of persons required : 1 - 2

Necessary parts :

- Outrigger Cylinder - 4527A - HTA16P : A-00138 - Number : 4
- Outrigger Cylinder - 3522A - HTA13P : A-01138 - Number : 4
- Outrigger Cylinder - 5533A - HTA19P : A-02138 - Number : 4
- Primary lift cylinder - 3522A - HTA13P : A-01551 - Number : 1
- Secondary lift cylinder - 3522A - HTA13P : A-01555 - Number : 1
- Lift cylinder - 4527A - HTA16P, 5533A - HTA19P : A-02551 - Number : 2
- Master cylinder - 3522A - HTA13P, 4527A - HTA16P, 5533A - HTA19P : A-01552 - Number : 1
- Slave cylinder - 3522A - HTA13P, 4527A - HTA16P, 5533A - HTA19P : A-01552 - Number : 1
- Slave cylinder - 3522A - HTA13P, 4527A - HTA16P, 5533A - HTA19P : A-01553 - Number : 1
- Jib cylinder - 3522A - HTA13P, 4527A - HTA16P, 5533A - HTA19P : A-00660 - Number : 1
- Extension cylinder - 3522A - HTA13P : A-01550 - Number : 1
- Extension cylinder - 4527A - HTA16P : A-03550 - Number : 1
- Extension cylinder - 5533A - HTA19P : A-02550 - Number : 1

## 13.2 - Safety instructions

- **The technician should take all steps to protect themselves or others against all risks of injury related to this intervention.**
- **The technician should ensure that suitable PPE (personal protective equipment) for the job is used, and check the particular conditions of environment in which the material can be found (see safety information specific to the operation site).**
- **Position the machine on a flat ground, stabilized and in a released environment.**
- **Always cordon off the area around the base of the machine to keep personnel and other equipment away from the machine while in use.**
- **Turn key to OFF position. Remove key. Unplug master battery disconnect.**
- **Place a `DO NOT USE' label near the start/stop contactor (key switch) to inform personnel that interventions are currently underway on the equipment.**
- **The pressure in the hydraulic system is very important. It can cause accidents. Relieve the pressure before any intervention and never search for oil leaks using your hands.**
- **Attention to the risks of burns, the hydraulic system works at high temperatures.**
- **The exhaust fumes of engines contain harmful products of combustion. Only start and run the engine in a well ventilated area. When operating in a closed room, use suitable system to evacuate the exhaust to the outside.**

## 13.3 - Tools required

- PPE (Personal Protective Equipment: Safety shoes, gloves, glasses...... etc.).
- 13, 16, 17, 18, 19, 21, 22 mm wrench.
- 5, 10 mm Rubber mallet.
- 14 mm (3/8 in) Diameter Dowel punch.
- Overhead hoist and lifting straps.
- Hammer.

## 13.4 - Cylinder replacement procedure

- If repair or replacement of an aerial work platform or outrigger hydraulic cylinder or its component parts becomes necessary, observe the following procedures in accordance with the safety precautions of this manual.
- Removing the hydraulic cylinder from the aerial work platform may require the use of specialized tools and lifting equipment. Never attempt to operate overhead hoists or cranes or related equipment without proper training, authorization and supervision. Perform all maintenance procedures only in an area that is well-lit and well-ventilated. HAULOTTE® is not responsible for personal injury or property damage resulting from the improper use of equipment or failure to follow all procedures and related safety precautions.

**Repair and removal of the hydraulic cylinder requires the use of lifting straps and an overhead crane or lifting gear to support the aerial work platform and hydraulic cylinders. Personnel should be thoroughly trained in the operation of these devices before attempting installation or removal. Hydraulic cylinders are heavy and may have hydraulic oil on their surface. Failure to use proper equipment or to securely support aerial work platform and cylinders could result in death or serious injury and damage to aerial work platform.**

### 13.4.1 - Outrigger cylinder

1. Use the following procedure to remove and replace faulty or damaged hydraulic cylinders on the outriggers. DO NOT transfer the weight of the aerial work platform onto the outrigger. Leave the weight of the aerial work platform on the trailer wheels.



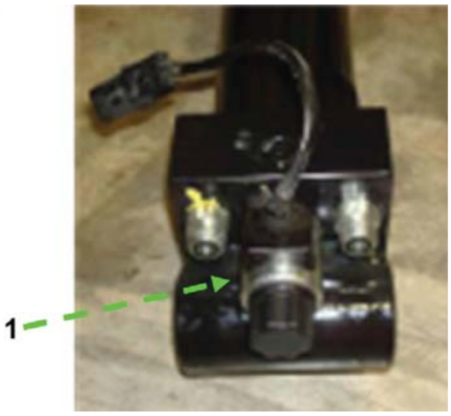
1. Place a block of wood shoring between the outrigger beam and cylinder.
2. At the piston rod end of the cylinder, unbolt and remove the retainer plate from the pivot pin.
3. Remove the pivot pin using a hammer and a brass punch.
4. Remove the bolts securing the outrigger cylinder guard. Remove the cylinder guard.
5. Fully retract the cylinder.
6. Turn the key at the ground control station to the OFF position and remove the key
7. Move the cylinder to an upright position.



8. Tag and number all hydraulic hoses that attach to the cylinder valve block. Use a marker to label the valve block ports with the appropriate hose numbers.
9. Unplug the cylinder valve solenoid ( 1 ).




10. Place absorbent cloths below the cylinder ports and detach hydraulic hoses from the cylinder. Elevate the hoses to prevent excess leakage. Plug or cap exposed hose fittings and cylinder ports.
11. At the base end of the cylinder, unbolt and remove the retainer plate from the pivot pin.
12. Remove the pivot pin using a hammer and a brass punch.
13. Lift and remove the cylinder using an overhead hoist and lifting straps or equivalent.
14. Unscrew the cylinder valve solenoid cap. Remove the solenoid ( 1 ). Unscrew and remove the valve.




15. Remove the valve block port fittings.
16. Replace or reinstall the cylinder by following the above instructions in the reverse order of removal. Tighten M10 bolts to 37 ft lbs, M8 bolts to 19 ft lbs, fittings to 40 ft lbs, solenoid valve to 30 ft lbs, and hoses to 30 ft lbs. Bolts going to the cylinder guard slide should be snug. Valve solenoid cap should be hand tight. Be sure to place the orifice in the extension side of the cylinder with the flat, round end facing out of the cylinder.
17. Actuate the hydraulic system and check for leakage. Tighten hydraulic fittings as necessary.
18. Bleed trapped air from the hydraulic system by raising and lowering the boom with the reservoir fill port cap on but not tightened. Allow several cycles of operation for trapped air to escape. Repeat as necessary.

### 13.4.2 - Primary lift cylinder

Use the following procedure to remove and replace faulty or damaged hydraulic cylinder on the aerial work platform.

- Start with the boom in the stowed position.
- Push and hold the valve button or handle on the lift cylinder to relieve the hydraulic pressure to the cylinder.
- Turn key switch at the ground control panel, to the OFF position and remove key.
- Remove the ground control panel cover for easier access to the primary lift cylinder fixtures.
- Locate the piston rod end ( 1 ) of the cylinder. Unbolt and remove the pin retainer from the pivot pin.



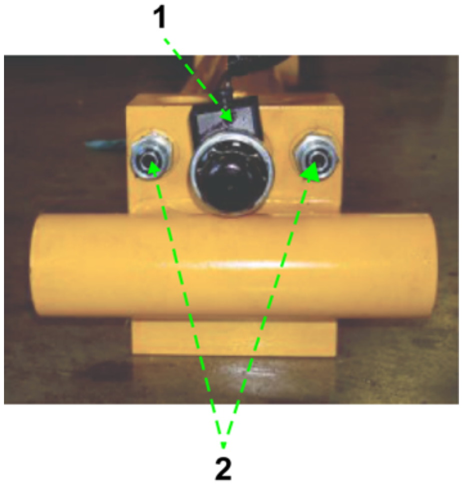
1

- Place a block of wood shoring between the boom and cylinder.
- Remove the pivot pin using a hammer and a brass punch.
- Use an overhead crane and lifting gear to raise the boom section away from the cylinder. Be sure to lift on the frame and avoid adding any pressure to hoses or fixtures. Provide adequate clearance to reach the cylinder valve block (base end) and hydraulic hose ports
- Unplug appropriate valve solenoid ( 2 ).
- Tag and number all hydraulic hoses that attach to the cylinder valve block. Use a marker to label the valve block ports with the appropriate hose numbers.
- Place absorbent cloths below the cylinder ports and detach hydraulic hoses from the cylinder. Elevate hoses to prevent excess leakage. Plug or cap exposed hose fittings and cylinder ports.



2

- At the base of the cylinder, unbolt and remove retainer plate from each side of the pivot pin.
- Place a block of wood shoring between the boom and the cylinder.
- Remove the pivot pin using a hammer and a brass punch.
- Lift and remove the cylinder using an overhead hoist and lifting straps or equivalent.
- Unscrew the cylinder valve solenoid cap. Remove the solenoid ( 1 ). Unscrew and remove the valve.
- Remove the valve block port fittings ( 2 ).
- Replace or reinstall the cylinder by following the above instructions in the reverse order of removal. Tighten bolts to 37 ft lbs, fittings to 40 ft lbs, solenoid valve to 30 ft lbs, and hoses to 30 ft lbs. Valve solenoid cap should be hand tight. Be sure to place the orifice in the extension side of the cylinder with the flat, round end facing out of the cylinder.
- Actuate the hydraulic system and check for leakage. Tighten hydraulic fittings as needed.
- Bleed trapped air from the hydraulic system by raising and lowering the primary boom with the reservoir fill port cap on, but not tightened. Allow several cycles of operation for trapped air to escape. Repeat as necessary.



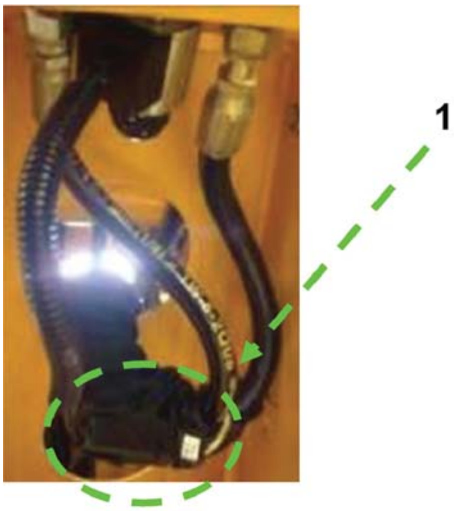
### 13.4.3 - Secondary lift cylinder

Use the following procedure to remove and replace faulty or damaged hydraulic cylinder on the aerial work platform.

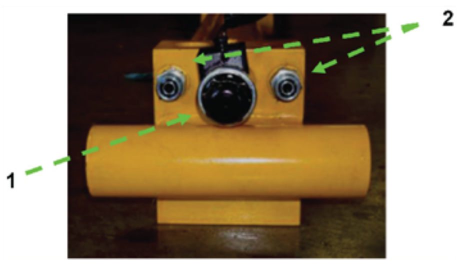
- Start with the boom in the stowed position.
- Push and hold the valve button or handle on the lift cylinder to relieve all hydraulic pressure to the cylinder.
- Turn key switch at the ground control panel, to the OFF position and remove key.
- Locate the piston rod end ( 1 ) of the cylinder to be removed. Unbolt and remove the pin retainer from the pivot pin.




- Use an overhead crane and lifting gear to support the rod end of the cylinder.
- Remove the pivot pin using a hammer and a brass punch.
- Unplug valve solenoid ( 1 ).
- Tag and number all hydraulic hoses that attach to the cylinder valve block. Use a marker to label the valve block ports with the appropriate hose numbers.
- Place absorbent cloths below the cylinder ports and detach hydraulic hoses from the cylinder. Elevate hoses to prevent excess leakage. Plug or cap exposed hose fittings and cylinder ports.
- Place a block of wood shoring between the boom and the piston rod end of the cylinder. Lower the piston rod end to the wood shoring.
- Move the lifting gear and overhead crane to the base end of the cylinder.




- Remove the pivot pin using a hammer and a brass punch.
- Lift and remove the cylinder using an overhead hoist and lifting straps or equivalent.
- Unscrew the cylinder valve solenoid cap. Remove the solenoid and valve ( 1 ).
- Remove the valve block port fittings ( 2 )
- Replace or reinstall the cylinder by following the above instructions in the reverse order of removal. A new cylinder will require hydraulic hoses to be attached and the machine run to fit the piston rod end to the boom. Tighten bolts to 37 ft lbs, fittings to 40 ft lbs, solenoid valve to 30 ft lbs, and hoses to 30 ft lbs. Valve solenoid cap should be hand tight. Be sure to place the orifice in the extension side of the cylinder with the flat, round end facing out of the cylinder.




- Actuate the hydraulic system and check for leakage. Tighten hydraulic fittings as needed.
- Bleed trapped air from the hydraulic system by raising and lowering the secondary boom with the reservoir fill port cap on, but not tightened. Allow several cycles of operation for trapped air to escape. Repeat as necessary.

### 13.4.4 - Master cylinder

Use the following procedure to remove and replace faulty cylinders.

- Start with the boom in the stowed position.
- Lower the outriggers until weight is transferred to the outriggers and the machine is level.
- Raise the upper boom until there is adequate exposure of the piston rod end pin retainer and pivot pin for removal. Turn key switch at the ground control panel, to the OFF position and remove key.
- Use lifting straps and an overhead hoist, or the equivalent, to support the upper boom near the platform.

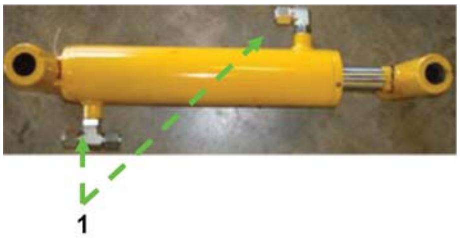



- Unbolt and remove the pin retainer at the piston rod end ( 1 ) of the cylinder.
- Remove the pivot pin using a hammer and a brass punch.
- Tag and number all hydraulic hoses that attach to the cylinder. Use a marker to label the ports with the appropriate hose numbers.
- Place absorbent cloths below the cylinder ports and detach hydraulic hoses from the cylinder. Elevate hoses to prevent excess leakage. Plug or cap exposed hose fittings and cylinder ports.
- Unbolt and remove the pin retainer at the base of the cylinder.
- Remove the pivot pin using a hammer and a brass punch.

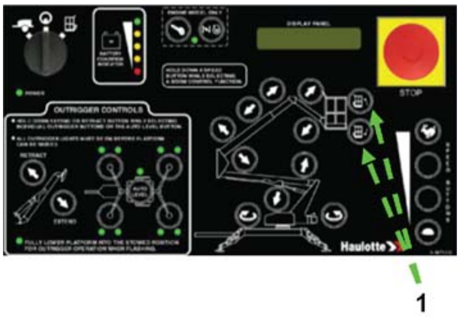
1



- While lifting the cylinder out of the frame rotate the cylinder to fit the base end through the frame.
- Remove the port fittings ( 1 ).
- Replace or reinstall the cylinder by following the above instructions in the reverse order of removal. A new cylinder will require the piston rod end to be extended to fit to the boom. Extending the cylinder can be done by hand. Tighten bolts to 37 ft lbs, fittings to 40 ft lbs, and hoses to 30 ft lbs.
- Actuate the hydraulic system and check for leakage. Tighten hydraulic fittings as needed.




- Bleed trapped air from the master/slave circuit by raising the secondary boom, extending the telescopic boom halfway out, and lifting the jib boom until it is fully extended. Activate the slave cylinder by rotating the platform cage up and down at the highest speed ( 1 ) (Platform Basket Level Platform).

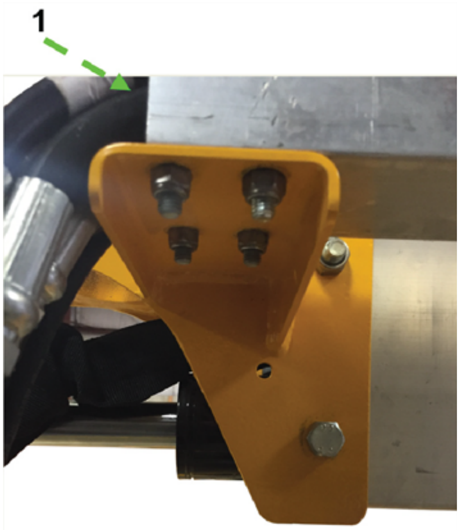


**13.4.5 - Slave cylinder**

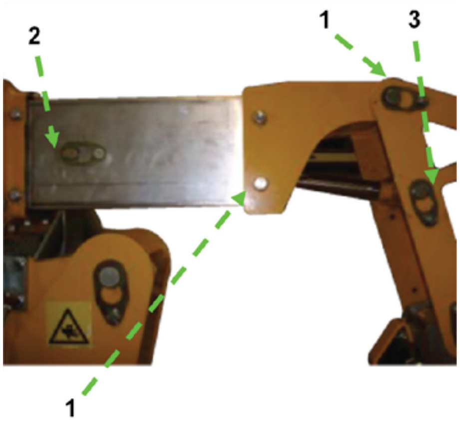
- Start with the boom in the stowed position.
- Set the outriggers keeping the machine in as low a position as possible. Remove the platform cage. Keep the upper control box attached to jib assembly.
- Extend telescopic boom section until there is adequate exposure of the base pivot pin and pin retainer.
- Use lifting straps and an overhead hoist, or the equivalent to support the jib boom at the top of the boom.
- Turn key switch at the ground control panel, to the OFF position and remove key.
- Tag and number both hydraulic hoses ( 1 ) that attach to the hose connection of the slave cylinder and run to additional hoses at the hose track.




- Place absorbent cloths below the hoses that are being disconnected. Elevate hoses to prevent leakage. Plug or cap exposed hose fittings and cylinder ports.
- Unbolt the hose track ( 1 ) from the extension cap.

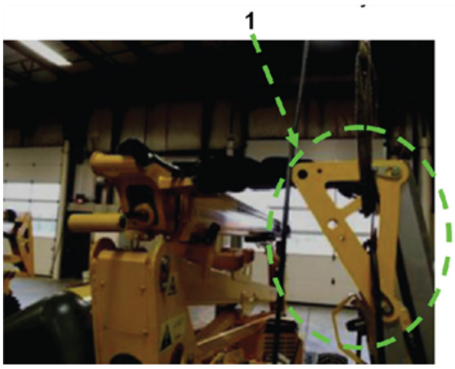



- Unbolt and remove the pin retainer at the rod end of the cylinder ( 3 )
- Remove the pivot pin using a hammer and a brass punch.
- Unbolt and remove the pin retainer ( 2 ) from the jib boom and the extension cap ( 1 )
- Unbolt and remove the extension cap ( 1 ).



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- Swivel the jib boom ( 1 ) to the side of the extension boom be careful to not overextend the hoses that are still attached.



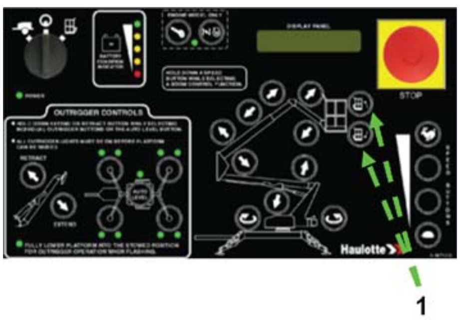

- Loosen the bolt holding one of the pin retainers ( 1 ) at the base end of the cylinder enough to allow the retainer to be moved out of the way.
- Remove the pivot pin using a hammer and a brass punch.
- Lift and remove the cylinder using lifting straps.




- Remove the hoses from the valve block. Remove the valve block port fittings ( 1 ).
- Replace or reinstall the cylinder by following the above instructions in the reverse order of removal. A new cylinder will require hydraulic hoses to be attached and the machine run to fit the piston rod end to the boom. . Tighten M8 bolts to 19 ft lbs, M10 bolts to 37 ft lbs, M12 bolts to 65 ft lbs , fittings to 30 ft lbs, #6 hose fittings to 30 ft lbs and M8 hose fittings to M8.




- Actuate the hydraulic system and check for leakage. Tighten hydraulic fittings as needed.
- Bleed trapped air from the master/slave circuit by raising the secondary boom, extending the telescopic boom halfway out, and lifting the jib boom until it is fully extended. Activate the slave cylinder by rotating the platform cage up and down at the highest speed ( 1 ) (Platform Basket Level Platform). When the slave cylinder is fully extended or retracted hold the button for 5 seconds. Go through 5 cycles to properly bleed all trapped air.



### 13.4.6 - Jib cylinder

Use the following procedure to replace faulty cylinders.

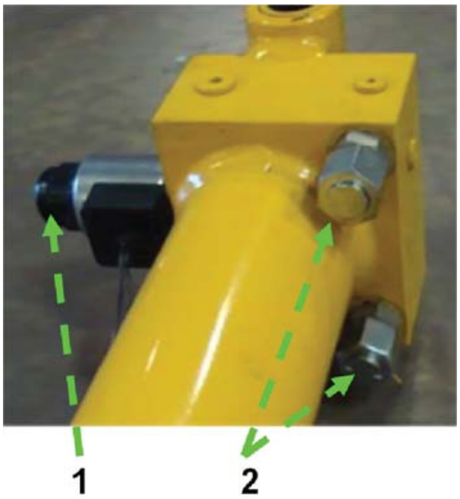
- Start with the boom in the stowed position. Remove the platform cage for easier access to the rod end of the jib cylinder.
- Use lifting straps and an overhead hoist, or the equivalent to support the jib boom at the bottom of the boom.



- Extend the jib boom until there is adequate room to access the jib cylinder ( 1 ).
- Turn key switch at the ground control panel, to the OFF position and remove key.
- Unbolt and remove the pin retainer at the rod end of the cylinder.
- Place a block of wood shoring between the boom and cylinder.
- Remove the pivot pin using a hammer and brass punch.
- Push and hold the valve button on the jib cylinder to relieve all hydraulic pressure to the cylinder.
- Tag and number all hydraulic hoses that attach to the cylinder valve block run to additional hoses at the hose track.
- Place absorbent cloths below the hoses that are being disconnected. Elevate hoses to prevent leakage. Plug or cap exposed hose fittings and cylinder ports.



- Unplug the valve solenoid ( 1 ).
- Unbolt and remove the pin retainer at the base end of the cylinder.
- Use lifting straps to support the base end of the jib boom and attach them to the upper part of the jib assembly.
- Remove the pivot pin using a hammer and a brass punch.
- Lift and remove the cylinder using lifting straps.
- Unscrew the cylinder valve solenoid ( 1 ) cap. Remove the solenoid and valve .
- Remove the valve block port fittings ( 2 )
- Replace or reinstall the cylinder by following the above instructions in the reverse order of removal. A new cylinder will require hydraulic hoses to be attached and the machine run to fit the piston rod end to the boom. Tighten bolts to 37 ft lbs, fittings to 40 ft lbs, and hoses to 30 ft lbs. Valve solenoid cap should be hand tight. Be sure to place the orifice in the extension side of the cylinder with the flat, round end facing out of the cylinder.
- Actuate the hydraulic system and check for leakage. Tighten hydraulic fittings as needed.
- Bleed trapped air from the hydraulic system by raising and lowering the jib boom with the reservoir fill port cap on, but not tightened. Allow several cycles of operation for trapped air to escape. Repeat as necessary.



### 13.4.7 - Extension cylinder

Use the following procedure to replace faulty cylinders.

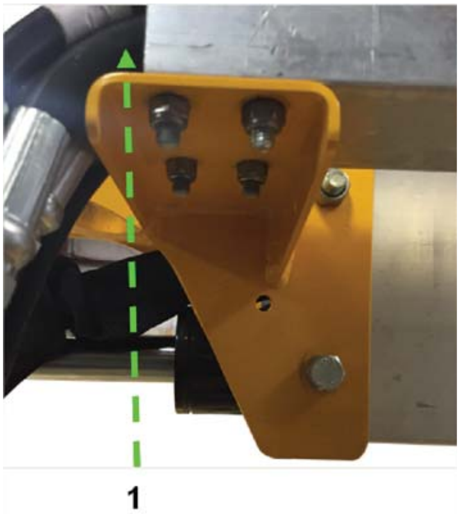
- Start with the boom in the stowed position. Set the outriggers keeping the machine in as low a position as possible. Remove the platform cage. Keep the upper control box attached to jib assembly.
- Extend telescopic boom section until there is adequate exposure of the base pivot pin and pin retainer.
- Use lifting straps and an overhead hoist, or the equivalent to support the jib boom at the top of the boom.



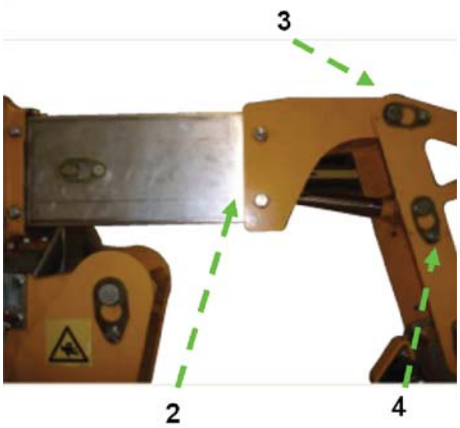

- Turn key switch at the ground control panel, to the OFF position and remove key.
- Tag and number both hydraulic hoses ( 1 ) that attach to the hose connection of the slave cylinder and run to additional hoses at the hose track.
- Place absorbent cloths below the hoses that are being disconnected. Elevate hoses to prevent leakage. Plug or cap exposed hose fittings and cylinder ports.



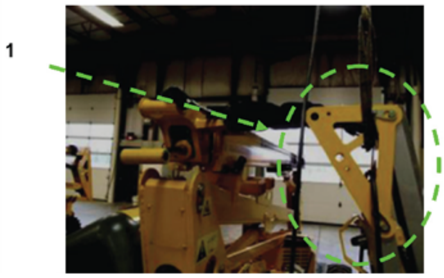
- Unbolt the hose track ( 1 ) from the extension cap.



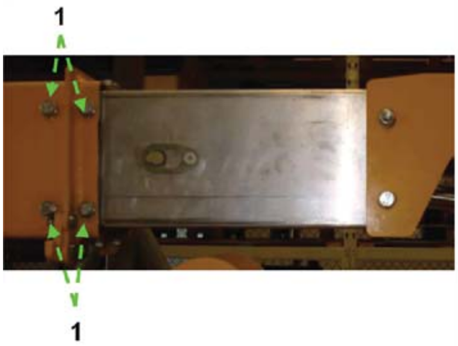

- Unbolt and remove the pin retainer ( 3 ) at the rod end of the cylinder ( 4 ).
- Remove the pivot pin using a hammer and a brass punch.
- Unbolt and remove the pin retainer from the jib boom and the extension cap ( 3 ).




- Swivel the jib boom ( 1 ) to the side of the extension boom be careful to not overextend the hoses that are still attached.




- Remove the 16 bolts holding the slide blocks ( 1 ) in place around all four sides of boom tubing. Make note of which slide block, shim, and bolt/washer combinations are in each position.



- Remove the Extension cap ( 1 ) from the inner aluminum boom tube. Remove the 8 bolts from the extension cap ( 2 ). Once removed manuever the extension cap back and forth until you are able to free it from the inner aluminum boom tube ( 4 ).

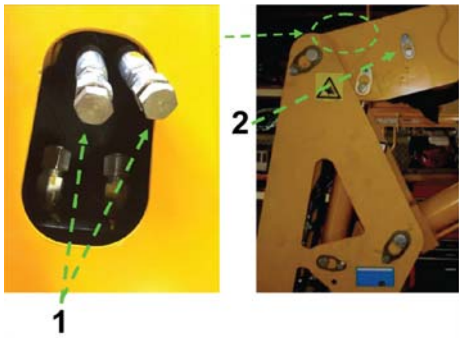



- Tilt the extension cap sideways and manuever it around the slave cylinder ( 3 ) to remove completely.



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- Tag and number all hydraulic hoses ( 1 ) that attach to the extension cylinder valve block at the base ( 2 ) of the cylinder. Use a marker to label the valve block ports with the appropriate hose numbers.
- Place absorbent cloths below the cylinder ports and detach hydraulic hoses from the cylinder. Elevate hoses to prevent leakage. Plug or cap exposed hose fittings and cylinder ports.
- Unbolt and remove the pin retainer at the base of the cylinder.

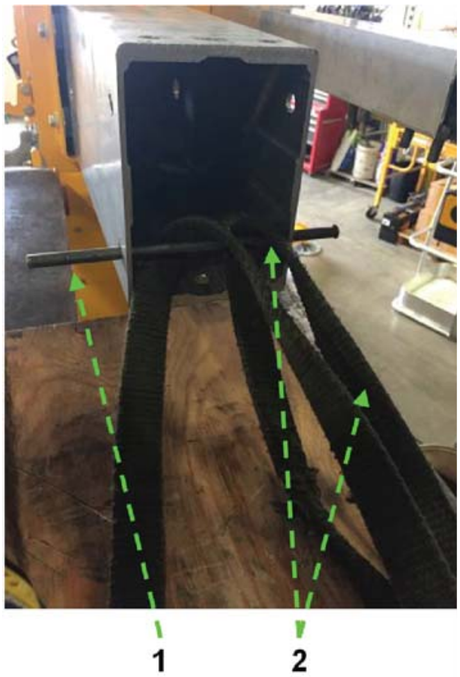



- Remove the pivot pin using a hammer and a brass punch on all models except the 6543A.
- Using an overhead hoist and a forklift remove the boom assembly all together; inner boom tube ( 6543A only), inner aluminum boom tube, extension cylinder, and slave cylinder assembly from the outer boom tube.






- Wrap a 1'' x 6ft, 4900 lbs max capacity strap around the boom section just 2 ft out in front of the outer boom tube. The strap needs to be in the basket hitch technique.
- Once the strap is in place slowly lift the hoist or equivalent lifting device until the strap is firmly holding the boom section.
- At the end of the inner aluminum boom tube insert a 1 '' diameter x 12'' inches long punch ( 1 ) through the bottom left and right bolt holes for the extension cap while threading through a 1'' x 3 ft, 3000 lbs max capacity strap ( 2 ).




- Move the forks of the forklift to the center of the mast until both forks make contact with each other. Using 2 (2x4s) approximately 10'' wide stacked ontop of each other or equivalent to stabalize the boom on the forks. Lift the fork mast until the wood makes contact with the base of the aluminum boom tube and the edge of the forks make contact with the bottom edge of the inner boom tube.



- Thread the strap with another punch that will be inserted behind the two forks against the mast.

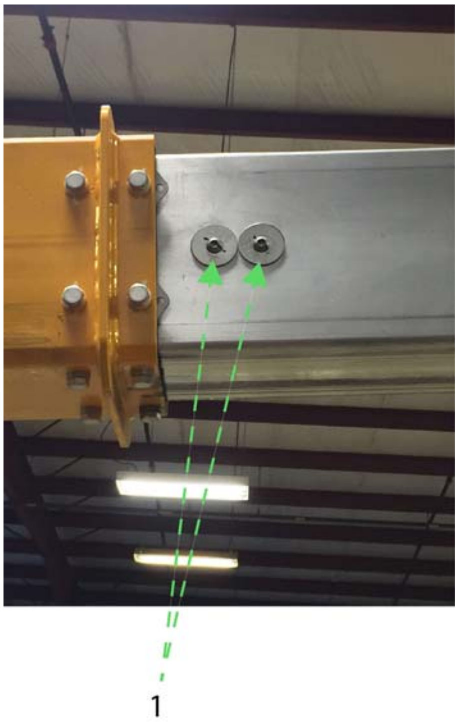


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- Utilizing another person drive the forklift slowly in reverse mainting a straight driving line. The second tech will need to operate the overhead hoist or equivalent in order to maintain stability while removing the boom section.
- Once the boom section is fully removed from the outter boom tube slowly place the boom section down on two boom stand or equivalent holding bases that allow stability during the cylinder removal procedure from the inner boom tube(s).



- Remove the pins ( 1 ) holding the piston rod end of the cylinder to the boom tube.

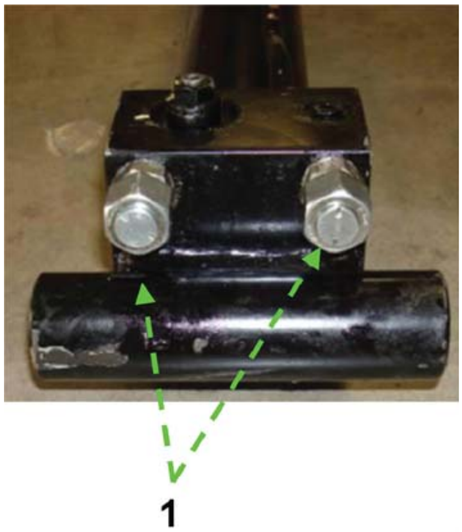


- For 6543A only : Remove the 2 alan head bolts holding the valve block of the rear end of the extension cylinder ( 1 ) to the inner steel boom tube. Pay careful attention to the 2 plastic spacers ( 2 ) between the cylinder and the boom walls while removing the bolts. Make sure to pay attention to the direction that each spacer is mounted.
- Slide the extension cylinder out of the inner aluminum boom tube from rear of the boom tube end where the slide pads are mounted.
- Pay attention to secure the cylinder during removal as to prevent injuries.





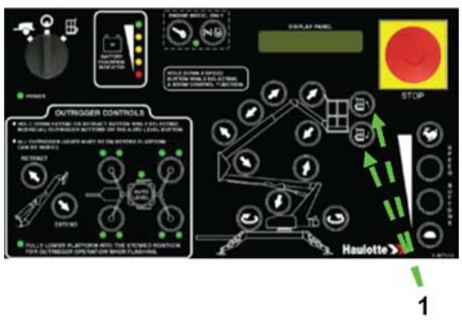

- Once removed and placed in a secure area remove the valve block port fittings ( 1 ).




- Remove the slider blocks ( 1 ) from the piston rod end of the cylinder.
- Replace or reinstall the cylinder by following the above instructions in the reverse order of removal. Tighten M8 bolts to 19 ft lbs, M10 bolts to 37 ft lbs, M16 bolts to 161 ft lbs , fittings to 40 ft lbs, #6 hose fittings to 30 ft lbs and M8 hose fittings to M8. Tighten all bolts attaching to plastic until they are snug. At the piston rod end of the cylinder replace bolts using lock tight.
- Actuate the hydraulic system and check for leakage. Tighten hydraulic fittings as necessary.




- Bleed trapped air from the telescopic boom by retracting and extending the boom with the reservoir rill port cap on but not tightened. Allow several cycles of operation for trapped air to escape. Repeat as necessary.
- Bleed trapped air from the master/slave circuit by raising the secondary boom, extending the telescopic boom halfway out, and lifting the jib boom until it is fully extended. Activate the slave cylinder by rotating the platform cage up and down at the highest speed ( 1 ) (Platform Basket Level Platform). When the slave cylinder is fully extended or retracted hold the button for 5 seconds. Go through 5 cycles to properly bleed all trapped air.




## 13.5 - PRE-OPERATION INSPECTION

Refill hydraulic oil as needed. Clean all oil spilt while removing cylinders.

Run all cylinders that were replaced to be sure they function properly.

# 14 - Basket removal /re-installation

## 14.1 - Description

Remove/Install the Platform Basket.

It is important that the person performing the work on the machine knows all the relative safety information contained in the instruction manual.

**Only an authorized and qualified technician can work on HAULOTTE® machines.**

- Number of persons required : 1
- Necessary parts : 2 Cotter Pins - 0090-0147

## 14.2 - Safety precautions

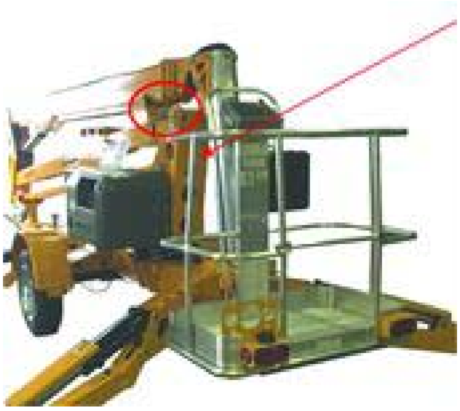
- **The technician should take all steps to protect themselves or others against all risks of injury related to this intervention.**
- **The technician should ensure that suitable PPE (personal protective equipment) for the job is used, and check the particular conditions of environment in which the material can be found (see safety information specific to the operation site).**
- **Position the machine on a flat ground, stabilized and in a released environment.**
- **When using a Telehandler, always cordon off the area areound the base of the Telehandler to keep personnel and other moving equipment away from the Telehandler while in use.**
- **Turn key to OFF position. Remove key. Unplug master battery disconnect.**
- **Place a `DO NOT USE' label near the start/stop contactor (key switch) to inform personnel that interventions are currently underway on the equipment.**
- **The pressure in the hydraulic system is very important. It can cause accidents. Relieve the pressure before any intervention and never search for oil leaks using your hands.**
- **Attention to the risks of burns, the hydraulic system works at high temperatures.**
- **The exhaust fumes of engines contain harmful products of combustion. Only start and run the engine in a well ventilated area. When operating in a closed room, use suitable system to evacuate the exhaust to the outside.**

## 14.3 - TOOLS REQUIRED

- PPE (Personal Protective Equipment: Safety shoes, gloves, glasses...... etc.).
- Standard Needle nose pliers.
- 2lb Rubber mallet.
- 3/8'' Diameter Dowel punch.
- 3/8'' diameter flat end dowel.
- Forklift.
- Standard 6'' Pliers.
- Standard #3 Phillips screwdriver.
- Standard #3 Flat head screwdriver.
- Electrical tape.
- 19 mm Wrench.
- Floor Jack.

## 14.4 - Basket removal procedure

- Place the boom in the stowed position with the outriggers extended. The jib and basket must be at their lowest positions with the basket level.



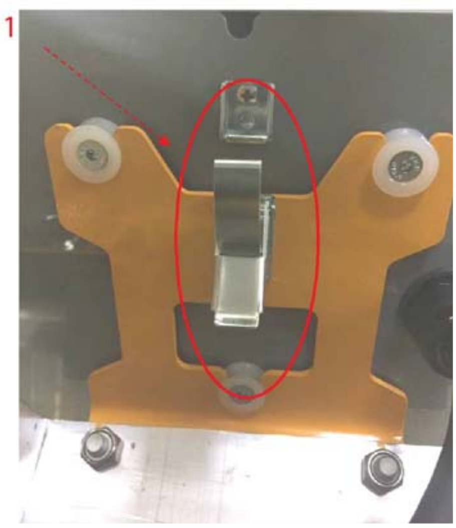
**The boom will remain in the cradle for the duration of this procedure.**

**Mark off the work area with cones and caution tape to prevent any injuries from occurring during the disassemble procedure.**

- Disconnect the upper control box cable from the boom cable ( 3 ) harness. Twist the bottom boom harness connector CCW (Counter clock wise) while holding firmly the upper control box cable connector.
- Un-wrap the upper control box harness from the cable cradle ( 2 ) holding it in place.




- UN-do the snap connector holding the upper control box to the rail mount. Set the control box with the harness off to the side for later installation.



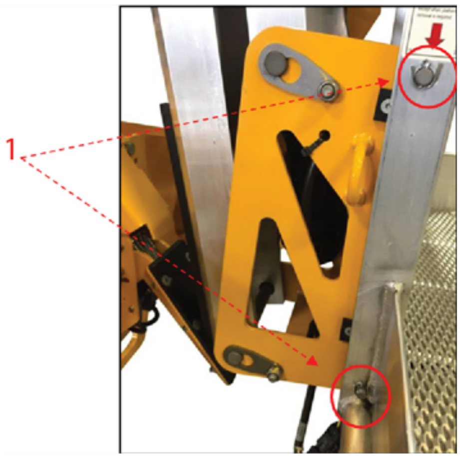
# D-Maintenance

- Locate the trailer lights connection on the bottom ground controls side of the platform basket facing the jib. This will be a 4 pin snap connector. Disconnect it.



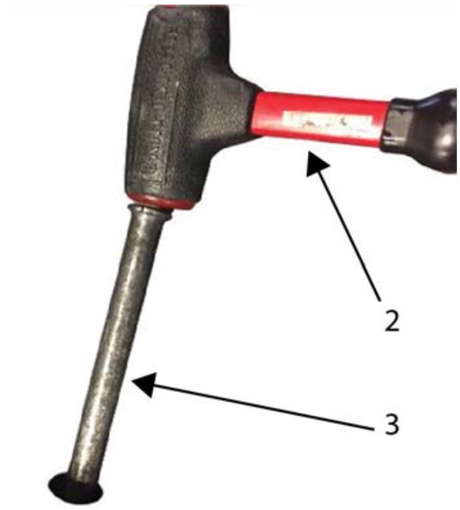


- Before the basket can be removed it must be secured using a forklift. Spread the forks out to a minimum of 3 ft and set the forks under the base of the basket so that it is stable when removed. Lift the forks until they have made contact with the base of the basket.
- Locate the 2 pins holding the platform basket to the basket/jib mount. Each pin is held in by 2 cotter pins ( 1 ) on each side of the pins. Using a standard pair of needle nose pliers remove 1 cotter pin from each mounting pin on the left ground controls side of the basket.



- Using a 2 lb rubber mallet ( 2 ) and a 3/8" diameter flat end dowel punch ( 3 ) tap out the mounting pins holding the basket to the Jib bracket until both pins are completely removed and the basket is resting on the floor jack ( 1 ). While holding the top rail of the basket and the floor jack ( 1 ) handle, roll the basket away from the jib and set off to the side.








### 14.5 - Basket re-Installation procedure

- Line the new basket up with the jib bracket. Using the jack lift the basket up and push towards the bracket until the basket bracket has overlapped the jib bracket.
- Install the basket mounting pins using the jack to adjust the basket to make for easy installation(If need be use the rubber mallet to tap in the pins). After pins are all the way inserted install the new cotter pins and bend both ends in 90° angles to prevent the pins from coming out.
- Re-connect the trailer lights 4 pin snap connector underneath the platform basket(Make sure to add non-conductive die-electric grease to the plug before installation). Using a zip tie secure the plug to the outside of the bottom railing.
- Retrieve the upper control box and harness. Connect the upper control box to the platform basket via the control box mount. Secure the control box by reconnecting the snap connector to the box.
- With the control box harness in your hand wrap it around the harness cradle until there is 2 ft of harness loose to which it can be connected to the boom harness(Before connecting the harnesses together add non-conductive die-electric grease to both ends of the harnesses). Connect the control box harness and the boom harness together. Twisting CW (clock wise) the boom harness end until it stops.
- With everything securely connected turn the machine power on by turning the key switch to the platform and disengaging both emergency stop buttons. All power should come and no fault codes should be visible.

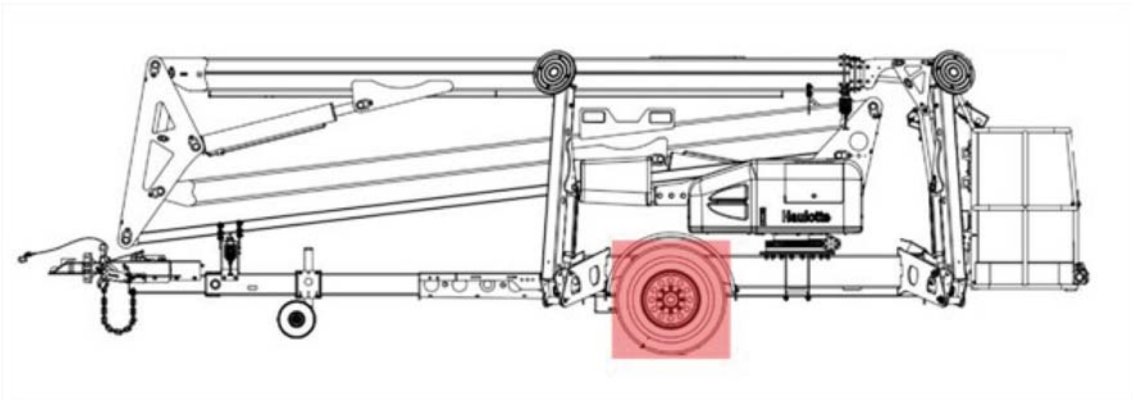
### 14.6 - Pre-operation inspection

Turn the machine power on and select the ground controls functions. Once operational function test the basket tilt functions to assure proper connection.

Inspect the state of the basket mounting pins, all electrical connections, hoses, and functions of the machine.

# 15 - Chassis wheel removal procedure

## 15.1 - Concerned area




## 15.2 - Description

Procedure to remove/replace chassis wheel.

It is important that the person performing the work on the machine knows all the relative safety information contained in the instruction manual.

**Only an authorized and qualified technician can work on HAULOTTE® machines.**

- Number of persons required : 1

## 15.3 - Safety precautions

- **The technician should take all steps to protect themselves or others against all risks of injury related to this intervention.**
- **The technician should ensure that suitable PPE (personal protective equipment) for the job is used, and check the particular conditions of environment in which the material can be found (see safety information specific to the operation site).**
- **Position the machine on a flat ground, stabilized and in a released environment.**
- **Mark out the work area.**
- **Turn key to OFF position. Remove key. Unplug master battery disconnect.**
- **Place a `DO NOT USE' label near the start/stop contactor (key switch) to inform personnel that interventions are currently underway on the equipment.**
- **The pressure in the hydraulic system is very important. It can cause accidents. Relieve the pressure before any intervention and never search for oil leaks using your hands.**
- **Attention to the risks of burns, the hydraulic system works at high temperatures.**
- **The exhaust fumes of engines contain harmful products of combustion. Only start and run the engine in a well ventilated area. When operating in a closed room, use suitable system to evacuate the exhaust to the outside.**

## 15.4 - Tools required

- PPE (Personal Protective Equipment: Safety shoes, gloves, glasses...... etc.)
- Wrench 21 mm (13/16 in) for 3522A - HTA 13 P, 4527A - HTA 16 P, 5533A - HTA 19 P, 3632T - HTT 13
- Wrench 22 mm (7/8 in) for 6543A - HTA 22 P
- Jack of 5 tonnes
- Wooden shims or jack stand to make a wedging of about 300 mm (1 ft) below the chassis
- A torque wrench with torque 27-34 Nm (or 20-25 ft lbs) with socket 21 mm (13/16 in) for wheel lug nuts
- A torque wrench with torque 122-162 Nm (or 90-120 ft lbs) with socket 21 mm (13/16 in) for wheel lug nuts
- Weight of wheel = 22 kg (48.5 lbs)
- Weight of wheel 6543A - HTA 22 P = 41 kg (90 lbs)

## 15.5 - Procedure to remove the chassis wheel using the outriggers

- Place the machine on flat and firm ground.
- Mark out the area of intervention.
- Place a `DO NOT USE' label near the start/stop contactor (key switch) to inform personnel that interventions are currently underway on the equipment.

- With the wrench 21 mm (13/16 in) (22 mm (7/8 in) for the 6543A model), loosen lug nuts of the wheel you need to remove



- Extend the outriggers from the lower control box in a stabilized position, in order to lift wheels from the ground.

**Check that the outrigger landing zones are free.**



- Totally unscrew the wheel's lug nuts and keep those bolts in a box.
- Use the wrench 21 mm (13/16 in) (22 mm (7/8 in) for the 6543A model).



- Handly remove the wheel in order to make the needed operation.

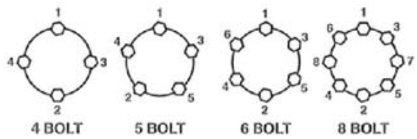
**Wheel weight (22 kg (48.5 lbs).**



- Replace the wheel and the lug nuts in their initial position.
- Screw the lug nuts until a medium torque (27-34 Nm or 20-25 ft lbs)



- Respect the tighten sequences patterns.




- Retract all outriggers to fully stowed position.
- Tighten the lug nuts until the maximum torque (122-162 Nm or 90-120 ft lbs).





**Check that there is nothing under the machine.**

**Do not exceed the torque maximum, it can damage the wheel.**

## 15.6 - Procedure to remove the chassis wheel using a jack

- Place the machine on flat and firm ground.
- Mark out the area of intervention.
- Place a `DO NOT USE' label near the start/stop contactor (key switch) to inform personnel that interventions are currently underway on the equipment.

- Ensure that the dolly wheel is locked in the lower position.





**Do not lift the machine without the dolly wheel locked.**

- Use the wrench 21 mm (13/16 in) (22 mm (7/8 in) for the 6543A model) ; Loosen lug nuts of the wheel you need to remove.



- Place the 5 tons jack under the axle.
- For the safety, put a shim or a jack stand 300 mm (1 ft) below the axle.

**Keep caution that the jack is well positioned in order to protect the brake wire.**



- Lift the wheel from the ground.
- Totally unscrew the wheel's lug nuts and keep those bolts in a box.



- Handly remove the wheel in order to make the needed operation.

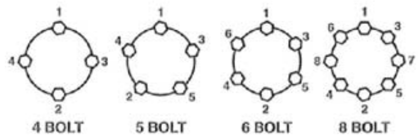
**Wheel weight (22 kg (48.5 lbs).**



- Replace the wheel and the lug nuts in their initial position.
- Screw the lug nuts until a medium torque(27-34 Nm or 20-25 ft lbs)



- Respect the tighten sequences patterns.




- Move down the machine.
- Remove the jack and the shim or the jack stand.
- Tighten the lug nuts until the maximum torque (122-162 Nm or 90-120 ft lbs).



**Check that there is nothing under the machine.**

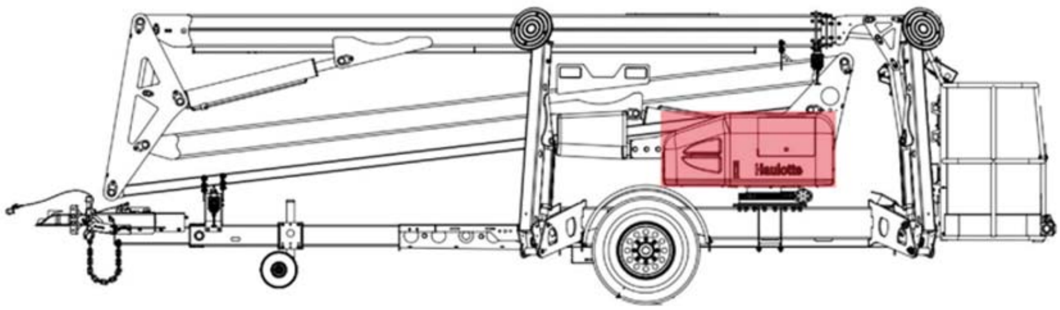
**Do not exceed the torque maximum, it can damage the wheel.**

## 15.7 - PRE-OPERATION INSPECTION

- Check the tire pressure.
- Tow in safety area before using on the road.

# 16 - Battery removal procedure

## 16.1 - Concerned area



## 16.2 - Description

Procedure to remove batteries.

It is important that the person performing the work on the machine knows all the relative safety information contained in the instruction manual.

**Only an authorized and qualified technician can work on HAULOTTE® machines.**

- Number of persons required : 1
- Necessary parts : 4 x 6 Volt battery - A - 00242

### 16.3 - SAFETY PRECAUTIONS

- **The technician should take all steps to protect themselves or others against all risks of injury related to this intervention.**
- **The technician should ensure that suitable PPE (personal protective equipment) for the job is used, and check the particular conditions of environment in which the material can be found (see safety information specific to the operation site).**
- **Position the machine on a flat ground, stabilized and in a released environment.**
- **Mark out the work area.**
- **Turn key to OFF position. Remove key. Unplug master battery disconnect.**
- **Place a `DO NOT USE' label near the start/stop contactor (key switch) to inform personnel that interventions are currently underway on the equipment.**
- **The pressure in the hydraulic system is very important. It can cause accidents. Relieve the pressure before any intervention and never search for oil leaks using your hands.**
- **Attention to the risks of burns, the hydraulic system works at high temperatures.**
- **The exhaust fumes of engines contain harmful products of combustion. Only start and run the engine in a well ventilated area. When operating in a closed room, use suitable system to evacuate the exhaust to the outside.**

### 16.4 - TOOLS REQUIRED

- PPE (Personal Protective Equipment: Safety shoes, gloves, glasses...... etc.).
- 2 wrench13 mm (1/2 in).
- 1 Torque wrench.

## 16.5 - PROCEDURE TO REMOVE BATTERIES

- Place the machine on flat and firm ground. Mark out the area of intervention.
- Turn the key switch to the OFF position and remove the key. Unplug the battery disconnect before performing operation.
- Place a `DO NOT USE' label near the start/stop contactor (key switch) to inform personnel that interventions are currently underway on the equipment.




- Open the left cover (the side of the ground control box).



**For safety, unplug the battery disconnect handle before working on the batteries.**



- Pull the battery box latch.



- Move the battery box until its stop.



- With a wrench 13 mm (1/2 in) , unscrew the 4 nuts which lock the electrical wires. And remove those wires.



- With two wrenches 13 mm (1/2 in), unscrew the bolt and the nuts which lock the battery hold down.



- Remove the battery hold down. And lift the batteries such as replace it.



### 16.6 - Reinstall

- Execute the same procedure for the two other batteries on the right side. Refer the following patterns to reconnect the batteries.

**Left side (Ground control box side)**



**Right side (pump side)**



- After completing the needed operation, operate in the reverse order, such as reassemble the batteries.
- Check the bolt thread.
- Replace all the anti-loosening nuts by new ones.
- Tighten the bolts and nuts until those following torque requirements(Do not exceed those requirements) :

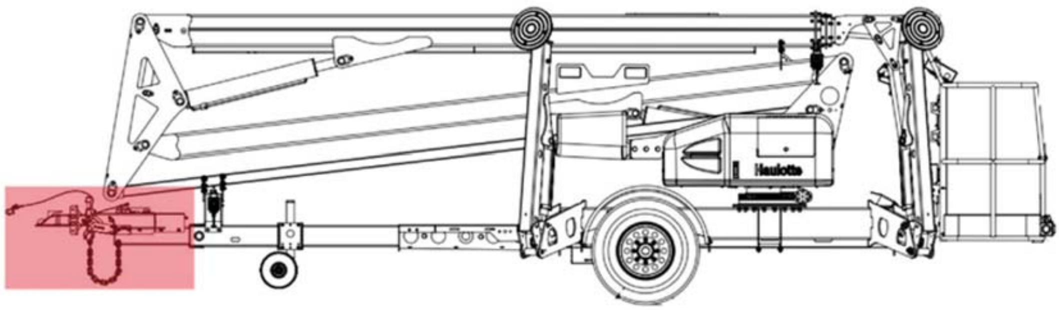
| Wrench size | Torque |
|---|---|
| 11 mm (7/16 in) | 10 Nm (8 ft.lbs) |
| 13 mm (1/2 in) | 23 Nm (17 ft.lbs) |
| 27 mm (11/16 in) | 67 Nm (50 ft.lbs) |
| 19 mm (3/4 in) | 101 Nm (75 ft.lbs) |
| 21 mm (13/16 in) | 149 Nm (110 ft.lbs) |
| 22 mm (7/8 in) | 149 Nm (110 ft.lbs) |
| 23 mm (15/16 in) | 203 Nm (150 ft.lbs) |

## 16.7 - PRE-OPERATION INSPECTION

- Switch on the contact key.
- Move different parts of the machine such as to check that the machine is functioning properly.

# 17 - Trailer hitch and coupler removal procedure

## 17.1 - Concerned area



## 17.2 - Description

Procedure to remove trailer hitch and coupler.

It is important that the person performing the work on the machine knows all the relative safety information contained in the instruction manual.

**Only an authorized and qualified technician can work on HAULOTTE® machines.**

- Number of persons required : 1

Necessary parts :
- Master cylinder : B12-00-0218 - Number : 1
- Cylinder fill cap : B12-00-0219 - Number : 1
- Master cylinder fill plate : B12-00-0233 - Number : 1
- Master cylinder : 6543A - HTA22P : B12-00-0269 - Number : 1
- Ball coupler 50 mm (2 in) : B12-00-0066 - Number : 1
- 2 Ball coupler 24 mm (5/16 in) : B12-00-0068 - Number : 1
- Brake fluid : DOT 3 - Brake fluid : 0.95l (32 oz)

### 17.3 - Safety precautions

- **The technician should take all steps to protect themselves or others against all risks of injury related to this intervention.**
- **The technician should ensure that suitable PPE (personal protective equipment) for the job is used, and check the particular conditions of environment in which the material can be found (see safety information specific to the operation site).**
- **Position the machine on a flat ground, stabilized and in a released environment.**
- **Always cordon off the area around the base of the Telehandler to keep personnel and other moving equipment away from the Telehandler while in use.**
- **Turn key to OFF position. Remove key. Unplug master battery disconnect.**
- **Place a `DO NOT USE' label near the start/stop contactor (key switch) to inform personnel that interventions are currently underway on the equipment.**
- **The pressure in the hydraulic system is very important. It can cause accidents. Relieve the pressure before any intervention and never search for oil leaks using your hands.**
- **Attention to the risks of burns, the hydraulic system works at high temperatures.**
- **The exhaust fumes of engines contain harmful products of combustion. Only start and run the engine in a well ventilated area. When operating in a closed room, use suitable system to evacuate the exhaust to the outside.**

### 17.4 - Tools required

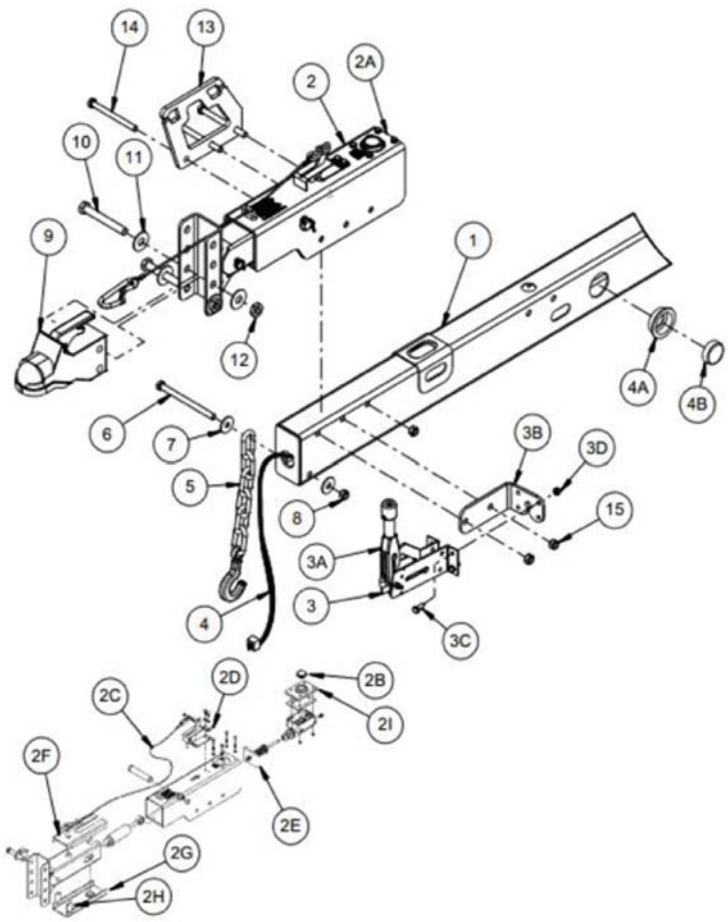
- PPE (Personal Protective Equipment: Safety shoes, gloves, glasses...... etc.).
- 1 wrench 10 mm (3/8 in).
- 1 wrench 13 mm (1/2 in).
- 2 wrenches 24 mm (15/16 in).
- 2 wrenches 19 mm (3/4 in).
- 1 wrench 11 mm (7/16 in).
- 1 Torque wrench.
- Plastic plugs.
- Drain pan.

### 17.5 - Procedure to remove cover cylinder

- Place the machine on flat and firm ground. Mark out the area of intervention.
- Turn the key switch to the OFF position and remove the key. Unplug the battery disconnect before performing operation.
- Place a `DO NOT USE' label near the start/stop contactor (key switch) to inform personnel that interventions are currently underway on the equipment.




**Identify each parts of the hitch-coupler in the procedures below**




- With two wrenches 24 mm (15/16 in), unscrew the two nuts ( 12 ) and the two bolts ( 10 ).



- Remove the bolts ( 10 ) and the ball coupler ( 9 ) from its mount.

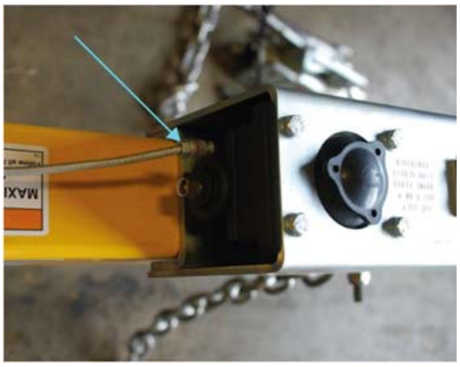


## 17.6 - Procedure to remove coupler and replace the master cylinder

- For an easy access, extend the outriggers in auto level position and lift the primary boom from its rest.



- With a wrench 13 mm (1/2 in) and a wrench 10 mm (3/8 in), unscrew the brake hose.
- And put a plastic plug to stop brake fluid leak.



- With a wrench 19 mm (3/4 in), unscrew the three nuts ( 15 ).



- Remove the hand brake ( 3 ).



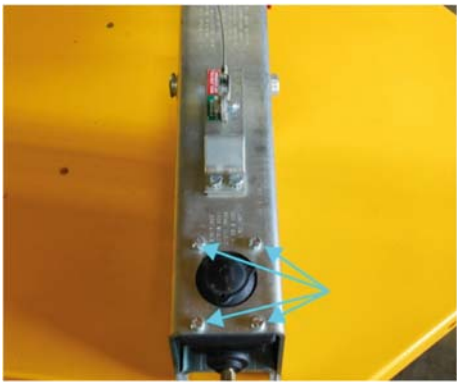
- Remove the tongue handle ( 13 ).



- Remove the coupler ( 2 ) from the tongue tube ( 1 ).
- Lay down the coupler on stable support.



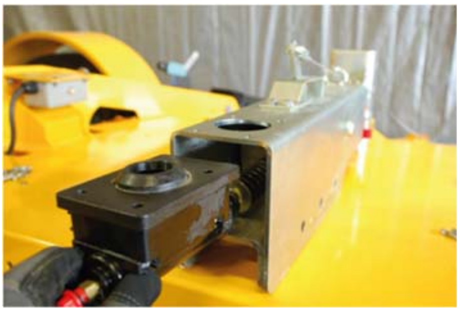
- To remove the master cylinder ( 2A ), with a wrench 11 mm (7/16 in), unscrew the four bolts which links the master cylinder and the coupler.



- Unscrew the cylinder fill cap ( 2B ).



- Pull the master cylinder ( 2 ) from the inside of the coupler.



- Remove the master cylinder fill plate ( 2I ). And drop all the brake fluid in a drain pan.

**Do not lose its seal.**



- Place the coupler in vertical position such as slide the new master cylinder ( 2 ) (or the old one) in the coupler.

**Some brake fluid can spurt during the spring compression.**

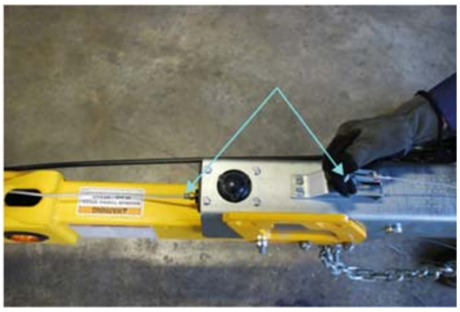


## 17.7 - Re-installation

- After completing the needed operation, operate in the reverse order, such as reassemble coupler and the trailer hitch.
- Fill the master cylinder with brake fluid ( 25.4 cm (1 in) high).
- Check the bolt thread.
- Replace all the anti-loosening nuts by new ones.
- Tighten the bolts and nuts until those following torque requirements (Do not exceed those requirements) :

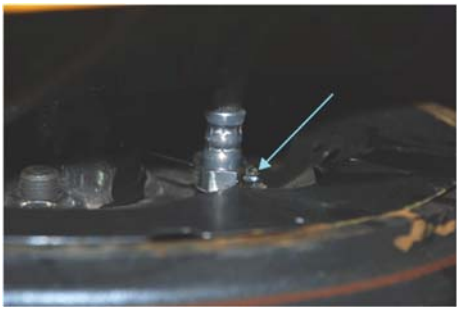
| Wrench size | Torque |
|---|---|
| 11 mm (7/16 in) | 10 Nm (8 ft.lbs) |
| 13 mm (1/2 in) | 23 Nm (17 ft.lbs) |
| 27 mm (11/16 in) | 67 Nm (50 ft.lbs) |
| 19 mm (3/4 in) | 101 Nm (75 ft.lbs) |
| 21 mm (13/16 in) | 149 Nm (110 ft.lbs) |
| 22 mm (7/8 in) | 149 Nm (110 ft.lbs) |
| 23 mm (15/16 in) | 203 Nm (150 ft.lbs) |

- With a wrench 13 mm (1/2 in) in and a wrench 10 mm (3/8 in), unscrew (not totally) the brake hose from the master cylinder output.
- Pull the emergency stop trigger (red position) such as load the master cylinder spring.
- Screw again the brake hose and push the emergency stop trigger (green position).
- Operate this procedure until the bake liquid leaks from the master cylinder output.



**Ensure that there is enough brake liquid in the reserve.**

- With a wrench 24 mm (15/16 in), unscrew the brake plug just behind the wheel.
- Pull the emergency stop trigger (red position) such as load the master cylinder spring.
- Screw again the brake plug and push the emergency stop trigger (green position).
- Operate this procedure until the bake liquid leaks from the brake plug behind the wheel.
- Operate similarly with the other wheel.



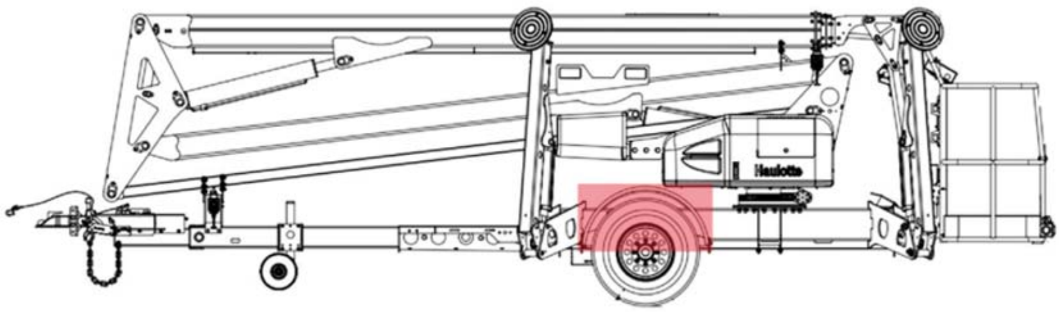
**Ensure that there is enough brake liquid in the reserve.**

## 17.8 - Pre-operation inspection

- Tow the machine in a safety area and try the brake system.

# 18 - Fender and fender mount removal procedure

## 18.1 - Concerned area



## 18.2 - Description

Procedure to remove fender and fender mount.

It is important that the person performing the work on the machine knows all the relative safety information contained in the instruction manual.

**Only an authorized and qualified technician can work on HAULOTTE® machines.**

- Number of persons required : 1

Necessary parts :
- Fender : A-00143 - Number : 2
- Fender mount left : A-00151-1 - Number : 1
- Fender mount right : A-00151-2 - Number : 1
- Fender - 6543A - HTA22P : 4000108660 - Number : 2
- Fender mount left - 6543A - HTA22P : 4000108670-1 - Number : 1
- Fender mount right - 6543A - HTA22P : 4000108670-2 - Number : 1

## 18.3 - SAFETY PRECAUTIONS

- **The technician should take all steps to protect themselves or others against all risks of injury related to this intervention.**
- **The technician should ensure that suitable PPE (personal protective equipment) for the job is used, and check the particular conditions of environment in which the material can be found (see safety information specific to the operation site).**
- **Position the machine on a flat ground, stabilized and in a released environment.**
- **Always cordon off the area around the base of the Telehandler to keep personnel and other moving equipment away from the Telehandler while in use.**
- **Turn key to OFF position. Remove key. Unplug master battery disconnect.**
- **Place a `DO NOT USE' label near the start/stop contactor (key switch) to inform personnel that interventions are currently underway on the equipment.**
- **The pressure in the hydraulic system is very important. It can cause accidents. Relieve the pressure before any intervention and never search for oil leaks using your hands.**
- **Attention to the risks of burns, the hydraulic system works at high temperatures.**
- **The exhaust fumes of engines contain harmful products of combustion. Only start and run the engine in a well ventilated area. When operating in a closed room, use suitable system to evacuate the exhaust to the outside.**

## 18.4 - TOOLS REQUIRED

- PPE (Personal Protective Equipment: Safety shoes, gloves, glasses...... etc.).
- 2 wrenches 17 mm (11/16 in).
- 2 wrenches 10 mm (metric size).
- 1 Torque wrench.

### 18.5 - Procedure to remove fender

- Place the machine on flat and firm ground. Mark out the area of intervention.
- Turn the key switch to the OFF position and remove the key. Unplug the battery disconnect before performing operation.
- Place a `DO NOT USE' label near the start/stop contactor (key switch) to inform personnel that interventions are currently underway on the equipment.



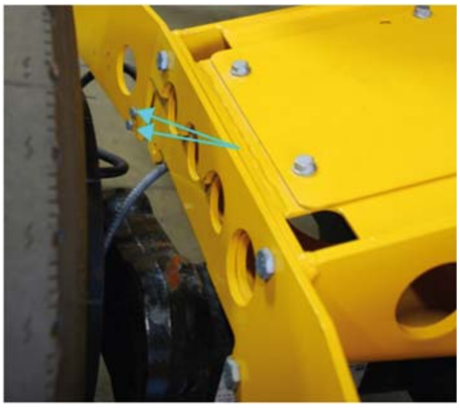

- With two wrenches 17 mm (11/16 in), unscrew the 4 nuts and bolts which lock the fender with its mount.



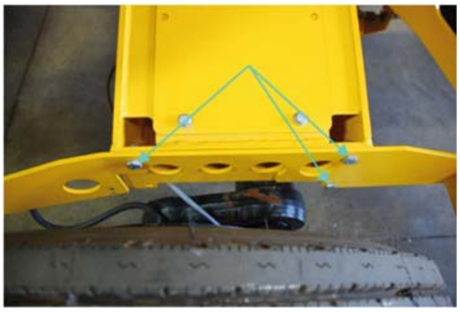
- Lift and remove the fender from its mount.



- With two wrenches 10 mm (metric size), unscrew the two nuts and bolts which lock the park brake hose and the brake hose.



- With two wrenches 11 mm (11/16 in), unscrew the 3 nuts and bolts which lock the fender mount.



- Remove the fender mount.



## 18.6 - Re-installation

- After completing the needed operation, operate in the reverse order, such as reassemble the fender mount and the fender.
- Check the bolt thread.
- Replace all the anti-loosening nuts by new ones.
- Tighten the bolts and nuts until those following torque requirements (Do not exceed those requirements) :

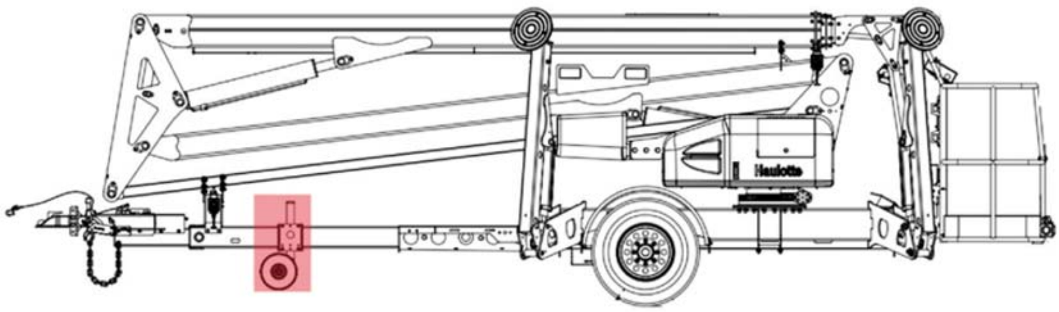
| Wrench size | Torque |
|---|---|
| 11 mm (7/16 in) | 10 Nm (8 ft.lbs) |
| 13 mm (1/2 in) | 23 Nm (17 ft.lbs) |
| 27 mm (11/16 in) | 67 Nm (50 ft.lbs) |
| 19 mm (3/4 in) | 101 Nm (75 ft.lbs) |
| 21 mm (13/16 in) | 149 Nm (110 ft.lbs) |
| 22 mm (7/8 in) | 149 Nm (110 ft.lbs) |
| 23 mm (15/16 in) | 203 Nm (150 ft.lbs) |

## 18.7 - Pre-operation inspection

- Check that there is no fender vibration when the machine is towed.

# 19 - Dolly wheel removal and maintenance procedure

## 19.1 - Concerned area



## 19.2 - Description

Procedure to remove the dolly wheel and make its maintenance.

It is important that the person performing the work on the machine knows all the relative safety information contained in the instruction manual.

**Only an authorized and qualified technician can work on HAULOTTE® machines.**

- Number of persons required : 1

Necessary parts :
- Tire and wheel : A-02165 - Number : 2
- Attach plate : A-02166 - Number : 1
- Mount assembly : A-02167 - Number : 1

- Grease NLGI grade 2 (see the following grease requirements) : B05-09-0001 - Number : 1

| Grease | |
|---|---|
| Thicker Type | Lithium Complex |
| Dropping Point | 215°C (419°F) minimum |
| Consistency | NLGI No. 2 |
| Additives | EP, Corrosion & Oxidation Inhibitors |
| Viscosity Index | 80 minimum |
| **Approved Grease Sources** | |
| ConocoPhillips / 76 Lubricants / Kendall | Multiplex RED #2<br>L427 Super Blu Grease |
| Citgo | Lithoplex MP #2<br>Lithoplex CM #2<br>Mystik JT-6 Hi-Temp Grease #2 |
| Exxon / Mobil Company | Ronex, MP<br>Mobilith AW 2<br>Mobil I Synthetic Grease |
| Oil Center Research of Oklahoma | Liquid-O-Ring No. 167L |
| Pennzoil-Quaker State Company | Synthetic Red Grease |
| Shell | ALBIDA EP 2<br>ALBIDA Grease SLC 220<br>Rotella Heavy Duty Lithium Complex #2 |
| Royal Manufacturing Company | Royal 98 Lithium Complex EP #2 |
| Chevron Texaco | Chevron Ulti-Plex Grease EP #2<br>Texaco Starplex Moly MPGM #2 |
| Valvoline | Valvoline Multi-Purpose GM<br>Valvoline Durablend |
| Great Plans Lubricants | Lithium Complex EP #2 |
| Chem Arrow | Arrow 2282 |

## 19.3 - Safety precautions

- **The technician should take all steps to protect themselves or others against all risks of injury related to this intervention.**
- **The technician should ensure that suitable PPE (personal protective equipment) for the job is used, and check the particular conditions of environment in which the material can be found (see safety information specific to the operation site).**
- **Position the machine on a flat ground, stabilized and in a released environment.**
- **Always cordon off the area around the base of the Telehandler to keep personnel and other moving equipment away from the Telehandler while in use.**
- **Turn key to OFF position. Remove key. Unplug master battery disconnect.**
- **Place a `DO NOT USE' label near the start/stop contactor (key switch) to inform personnel that interventions are currently underway on the equipment.**
- **The pressure in the hydraulic system is very important. It can cause accidents. Relieve the pressure before any intervention and never search for oil leaks using your hands.**
- **Attention to the risks of burns, the hydraulic system works at high temperatures.**
- **The exhaust fumes of engines contain harmful products of combustion. Only start and run the engine in a well ventilated area. When operating in a closed room, use suitable system to evacuate the exhaust to the outside.**

## 19.4 - Tools required

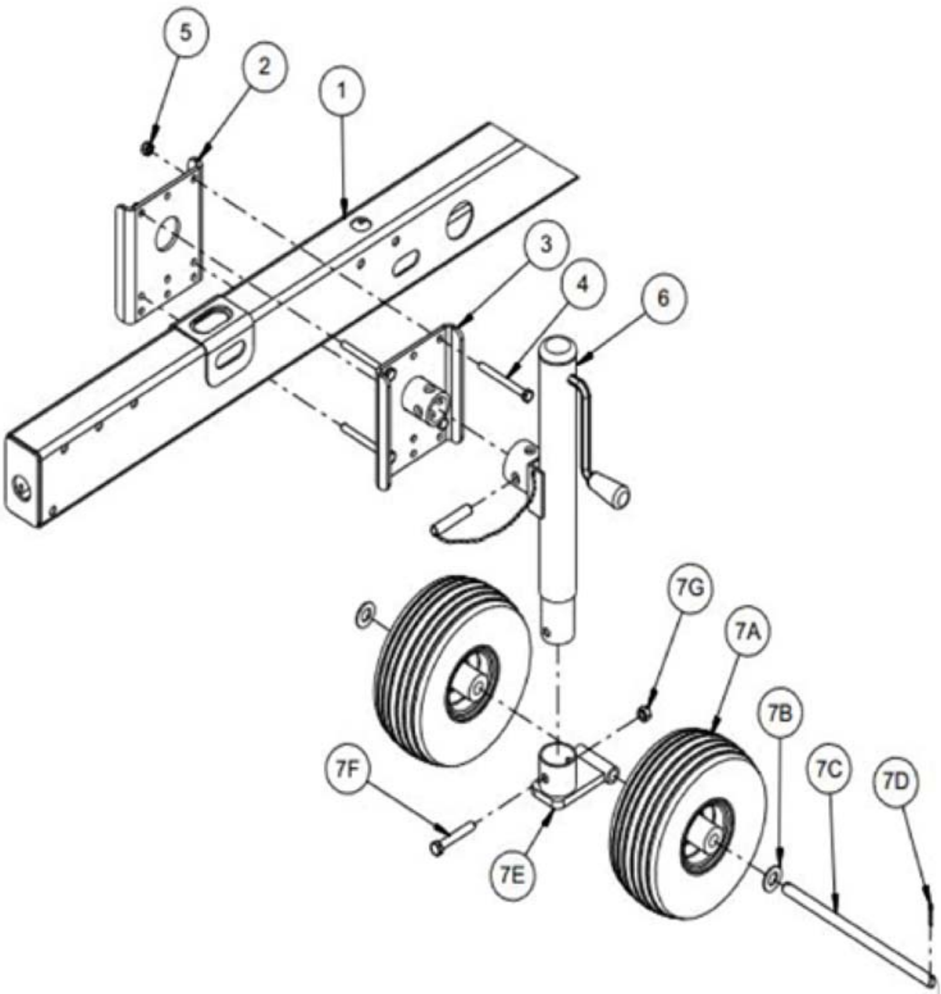
- PPE (Personal Protective Equipment: Safety shoes, gloves, glasses...... etc.).
- 2 wrenches 17 mm (11/16 in).
- 2 wrenches 11 mm (7/16 in) .
- 1 Torque wrench.
- Grease.

## 19.5 - Procedure to remove the dolly wheel and its mount

- Place the machine on flat and firm ground. Mark out the area of intervention.
- Turn the key switch to the OFF position and remove the key. Unplug the battery disconnect before performing operation.
- Place a `DO NOT USE' label near the start/stop contactor (key switch) to inform personnel that interventions are currently underway on the equipment.




**Identify each dolly wheel's parts in the procedures below**



- Extend in auto level mode the outriggers such as lift the dolly wheel from the ground.



- Pull the pin which locks the dolly wheel with the mount ( 3 ). And remove the dolly wheel from the mount ( 3 ).



- With two wrenches 17 mm (11/16 in), unscrew the 6 bolts ( 4 ) and nuts ( 5 ).
- And remove the attach plate ( 2 ) and the mount ( 3 ).



## 19.6 - Dolly wheel maintenance

- To remove the tire and the wheel, with pliers, pull the pin ( 7D ) from the axle ( 7C ).

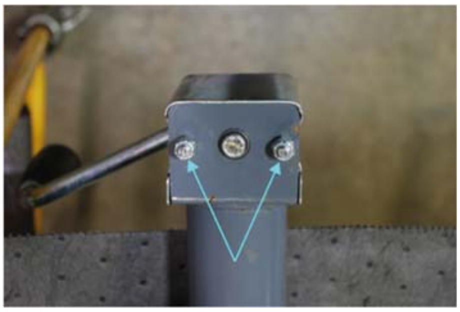


- Remove the wheel from the axle ( 7C ).

**Do not lose the flat washer 7B.**



- To grease the gears inside the jack ( 6 ), with two wrenches 11 mm (7/16 in), unscrew the two bolts and nuts which lock the metallic cover.

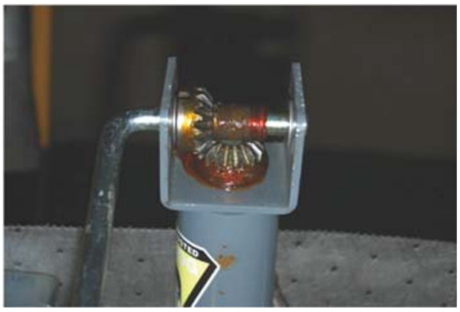


- Remove the metallic cover.



- Grease the gears inside the jack.

**Use the grease NLGI grade 2.**



## 19.7 - Re-installation

- After completing the needed operation, operate in the reverse order, such as reassemble the dolly wheel.
- Check the bolt thread.
- Replace all the anti-loosening nuts by new ones.
- Tighten the bolts and nuts until those following torque requirements (Do not exceed those requirements) :

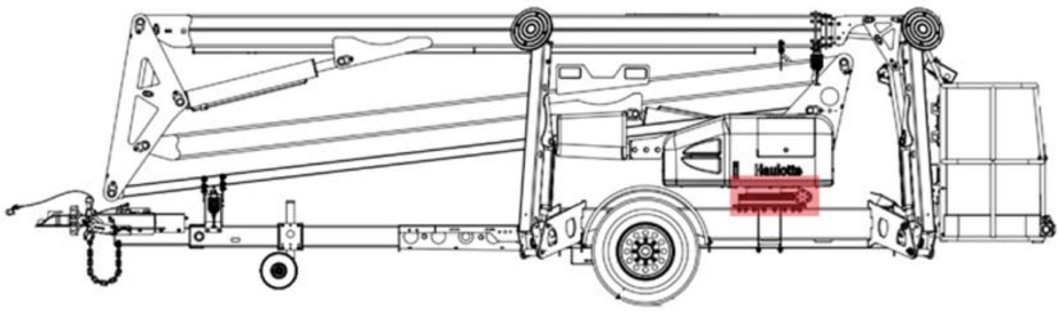
| Wrench size | Torque |
|---|---|
| 11 mm (7/16 in) | 10 Nm (8 ft.lbs) |
| 13 mm (1/2 in) | 23 Nm (17 ft.lbs) |
| 27 mm (11/16 in) | 67 Nm (50 ft.lbs) |
| 19 mm (3/4 in) | 101 Nm (75 ft.lbs) |
| 21 mm (13/16 in) | 149 Nm (110 ft.lbs) |
| 22 mm (7/8 in) | 149 Nm (110 ft.lbs) |
| 23 mm (15/16 in) | 203 Nm (150 ft.lbs) |

## 19.8 - Pre-operation inspection

- Switch on the contact key.
- Lock the dolly wheel in the lower position.
- Retract totally the outriggers.
- Lift and down the machine with the dolly wheel jack.

# 20 - Turntable maintenance

## 20.1 - Concerned area



## 20.2 - Description

Procedure to make the maintenance of the turntable (Slew ring).

It is important that the person performing the work on the machine knows all the relative safety information contained in the instruction manual.

**Only an authorized and qualified technician can work on HAULOTTE® machines.**

- Number of persons required : 1

Necessary parts :

- Grease NLGI grade 2 (see the following grease requirements) : B05-09-0001 - Number : 1

| Grease | |
|---|---|
| Thicker Type | Lithium Complex |
| Dropping Point | 215°C (419°F) minimum |
| Consistency | NLGI No. 2 |
| Additives | EP, Corrosion & Oxidation Inhibitors |
| Viscosity Index | 80 minimum |
| **Approved Grease Sources** | |
| ConocoPhillips / 76 Lubricants / Kendall | Multiplex RED #2<br>L427 Super Blu Grease |
| Citgo | Lithoplex MP #2<br>Lithoplex CM #2<br>Mystik JT-6 Hi-Temp Grease #2 |
| Exxon / Mobil Company | Ronex, MP<br>Mobilith AW 2<br>Mobil I Synthetic Grease |
| Oil Center Research of Oklahoma | Liquid-O-Ring No. 167L |
| Pennzoil-Quaker State Company | Synthetic Red Grease |
| Shell | ALBIDA EP 2<br>ALBIDA Grease SLC 220<br>Rotella Heavy Duty Lithium Complex #2 |
| Royal Manufacturing Company | Royal 98 Lithium Complex EP #2 |
| Chevron Texaco | Chevron Ulti-Plex Grease EP #2<br>Texaco Starplex Moly MPGM #2 |
| Valvoline | Valvoline Multi-Purpose GM<br>Valvoline Durablend |
| Great Plans Lubricants | Lithium Complex EP #2 |
| Chem Arrow | Arrow 2282 |

### 20.3 - SAFETY PRECAUTIONS

- **The technician should take all steps to protect themselves or others against all risks of injury related to this intervention.**
- **The technician should ensure that suitable PPE (personal protective equipment) for the job is used, and check the particular conditions of environment in which the material can be found (see safety information specific to the operation site).**
- **Position the machine on a flat ground, stabilized and in a released environment.**
- **When using a Telehandler, always cordon off the area areound the base of the Telehandler to keep personnel and other moving equipment away from the Telehandler while in use.**
- **Turn key to OFF position. Remove key. Unplug master battery disconnect.**
- **Place a `DO NOT USE' label near the start/stop contactor (key switch) to inform personnel that interventions are currently underway on the equipment.**
- **The pressure in the hydraulic system is very important. It can cause accidents. Relieve the pressure before any intervention and never search for oil leaks using your hands.**
- **Attention to the risks of burns, the hydraulic system works at high temperatures.**
- **The exhaust fumes of engines contain harmful products of combustion. Only start and run the engine in a well ventilated area. When operating in a closed room, use suitable system to evacuate the exhaust to the outside.**

## 20.4 - TOOLS REQUIRED

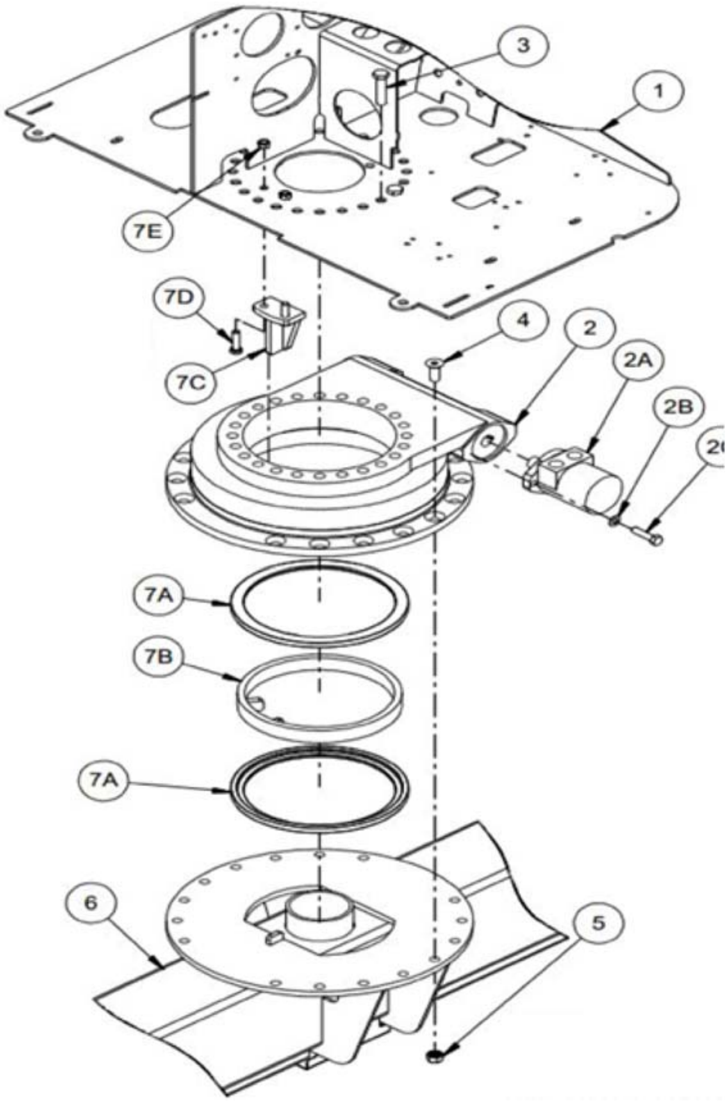
- PPE (Personal Protective Equipment: Safety shoes, gloves, glasses...... etc.).
- Grease gun.
- Standard multipurpose grease.
- 1 Spatula.
- 1 Allen wrench 13 mm (1/2 in).
- 1 Allen wrench 10 mm (metric size).
- 1 torque wrench with sockets 24 mm (15/16 in).
- 1 Caliper.

### 20.5 - Procedure to grease the slew ring

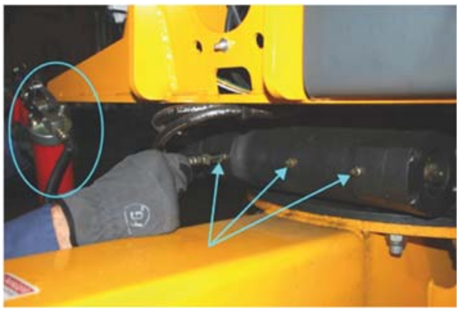
- Place the machine on flat and firm ground. Mark out the area of intervention.
- Turn the key switch to the OFF position and remove the key. Unplug the battery disconnect before performing operation.
- Place a `DO NOT USE' label near the start/stop contactor (key switch) to inform personnel that interventions are currently underway on the equipment.




**Identify each part of the turntable/slew ring assembly in the procedures below**



- Monthly, with a grease gun loaded with NLGI grade 2 grease, inject grease through the three grease fittings (around 5 injections for each).



- Monthly, with a spatula, spread regularly NLGI grade 2 grease all around the slew ring.

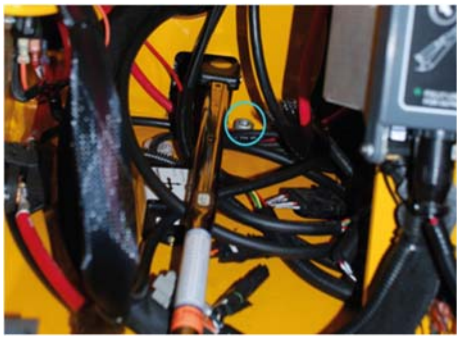


- Semi-annually, with a grease gun loaded with NLGI grade 2 grease, inject grease through the grease fittings on the back of the turntable and rotate simultaneously the turntable.
- Two persons are needed for this operation.

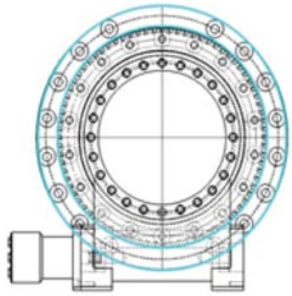
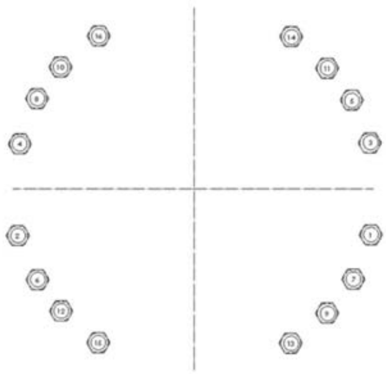


### 20.6 - Procedure to check the torque

- Semi-annually, with a torque wrench, verify the torque of the bolts ( 3 ) which link the turntable ( 1 ) and the slew ring ( 2 ).
- Use different socket extensions such as access to the bolts.



Respect the following torque requirements and torque sequences for the bolts ( 3 )

| Models | Wrench size | Torque | Torque sequences |
|---|---|---|---|
| 3522A - HTA13P | 10 mm Allen wrench | 234 Nm (173 ft.lbs) |  |
| 4527A - HTA16P - 5533A - HTA19P - 3632T - HTT13 | 10 mm Allen wrench | 271 Nm (200 ft.lbs) | |
| 45XA - HLA16PX - 55XA - HLA19PX | 10 mm Allen wrench | 271 Nm (200 ft.lbs) | |
| 6543A - HTA22P | 10 mm Allen wrench | 271 Nm (173 ft.lbs) |  |

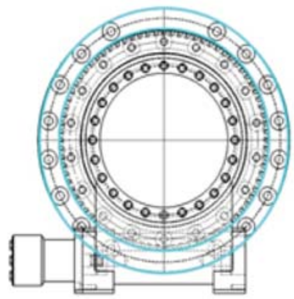
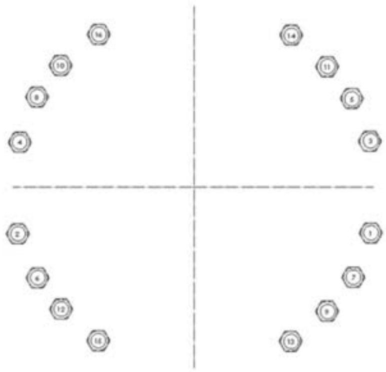
# D-Maintenance

- Semi-annually, with a torque wrench with a socket 24 mm (metric size) and an allen wrench 10 mm (metric size), verify the torque of the bolts ( 4 ) and the nuts ( 5 ) which link the slew ring ( 2 ) and the chassis ( 6 ).

**Some nuts and bolts are inaccessible; lift the booms and rotate the turntable such as work on it.**



Respect the following torque requirements and torque sequences for the bolts ( 4 ) and the nuts ( 5 )

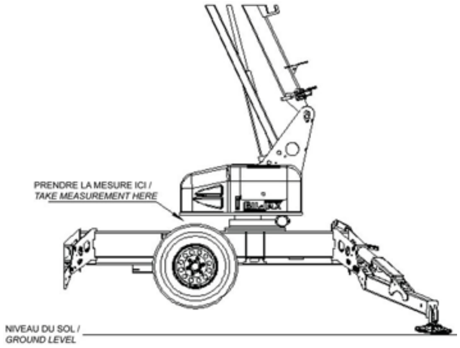
| Models | Wrench size | Torque | Torque sequences |
|---|---|---|---|
| 3522A - HTA13P | 10 mm Allen wrench | 234 Nm (173 ft.lbs) |  |
| 4527A - HTA16P - 5533A - HTA19P - 3632T - HTT13 | 10 mm Allen wrench | 271 Nm (200 ft.lbs) | |
| 45XA - HLA16PX - 55XA - HLA19PX | 10 mm Allen wrench | 271 Nm (200 ft.lbs) | |
| 6543A - HTA22P | 10 mm Allen wrench | 271 Nm (173 ft.lbs) |  |

## 20.7 - Re-installation

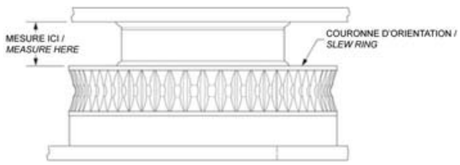
With the following procedure, check annually the slew bearing.

Check slew bearing for wear or damage :

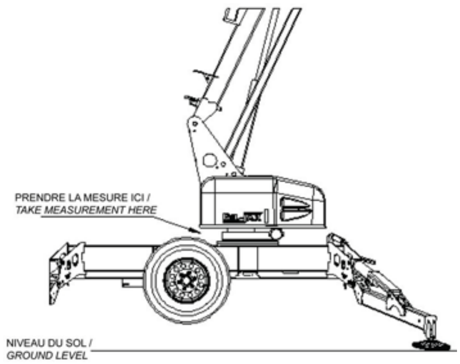
- Deploy the outriggers using the AUTO LEVEL and EXTEND buttons on the ground (lower) control box. The tires will be slightly off the ground in this position.
- Place a 65 kg (175 lb) load in the platform and raise the PRIMARY boom to the full out position.




- Measure the distance between the slew ring gear and the horizontal plate above, using a 50 mm (2 in) caliper or bore micrometer.




- Record the measurement.
- Rotate the platform 180 ° and re-record the measurement.
- If the difference in measurements is greater than 6,35 mm (0.25 in) the slew ring bearing should be replaced. Contact HAULOTTE Group Customer Service Department at 1-800-537-0540 or visit HAULOTTE Group online at www.haulotte-usa.com for additional information.

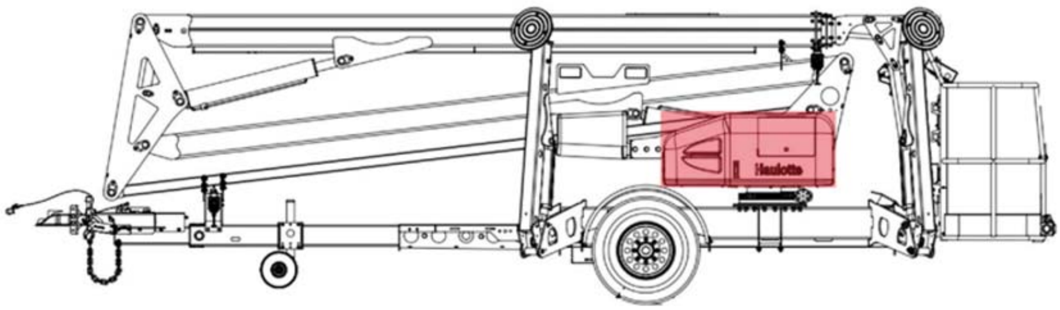



## 20.8 - Pre-operation inspection

- Lift the booms such as rotate the turntable until the stops in each direction.

# 21 - Cover and cover cylinder removal procedure

## 21.1 - Concerned area



## 21.2 - Description

Procedure to remove trailer hitch and coupler.

It is important that the person performing the work on the machine knows all the relative safety information contained in the instruction manual.

**Only an authorized and qualified technician can work on HAULOTTE® machines.**

- Number of persons required : 2

Necessary parts :
- Cover ; Right (Power unit side) : A-00239 - Number : 1
- Cover ; Left (Control side) : A-00240 - Number : 1
- Cover Brace : A-00228 - Number : 2
- Gas Spring (Cylinder) : A-00274 - Number : 2
- Hinge : A-00252 - Number : 4
- Pop Rivet : 0090-1080 - Number : 16

### 21.3 - Safety precautions

- **The technician should take all steps to protect themselves or others against all risks of injury related to this intervention.**
- **The technician should ensure that suitable PPE (personal protective equipment) for the job is used, and check the particular conditions of environment in which the material can be found (see safety information specific to the operation site).**
- **Position the machine on a flat ground, stabilized and in a released environment.**
- **When using a Telehandler, always cordon off the area areound the base of the Telehandler to keep personnel and other moving equipment away from the Telehandler while in use.**
- **Turn key to OFF position. Remove key. Unplug master battery disconnect.**
- **Place a `DO NOT USE' label near the start/stop contactor (key switch) to inform personnel that interventions are currently underway on the equipment.**
- **The pressure in the hydraulic system is very important. It can cause accidents. Relieve the pressure before any intervention and never search for oil leaks using your hands.**
- **Attention to the risks of burns, the hydraulic system works at high temperatures.**
- **The exhaust fumes of engines contain harmful products of combustion. Only start and run the engine in a well ventilated area. When operating in a closed room, use suitable system to evacuate the exhaust to the outside.**

### 21.4 - Tools required

- PPE (Personal Protective Equipment: Safety shoes, gloves, glasses...... etc.).
- 2 wrenches 13 mm (1/2 in).
- 2 wrenches 10 mm (metric size).
- 2 wrenches 19 mm (3/4 in).
- Drill 20 mm (3/16 in).
- Drilling machine.
- Wooden shims.
- Strap 254 cmm (100 in).

### 21.5 - Procedure to remove cover cylinder

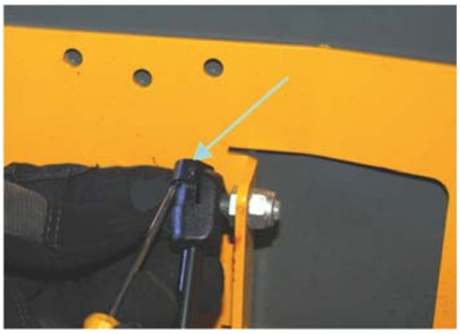
- Place the machine on flat and firm ground. Mark out the area of intervention.
- Turn the key switch to the OFF position and remove the key. Unplug the battery disconnect before performing operation.
- Place a `DO NOT USE' label near the start/stop contactor (key switch) to inform personnel that interventions are currently underway on the equipment.



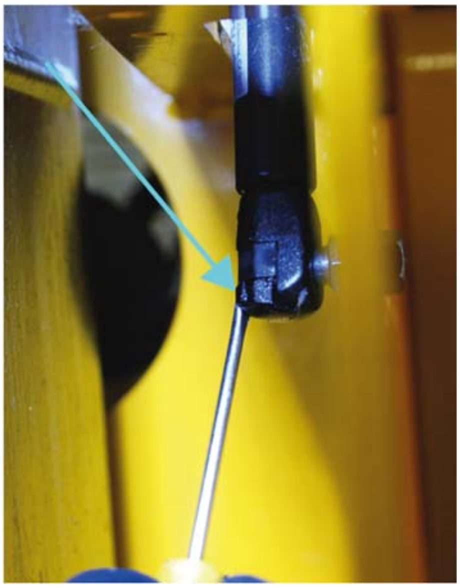

**For safety, put a strap which links the cover with the booms.**



- With a flat screwdriver, push up the trigger which locks the upper part of the gas spring (cover cylinder) with the cover brace.
- Remove the upper part of the gas spring.



- With a flat screwdriver, push up the trigger which locks the lower part of the gas spring.
- Remove the gas spring.



## 21.6 - Procedure to remove cover and cover brace

- With two wrenches 10 mm (metric size), unscrew the nuts which link the hinges with the cover and the cover brace.
- Remove the strap and put the cover in the stowed position.



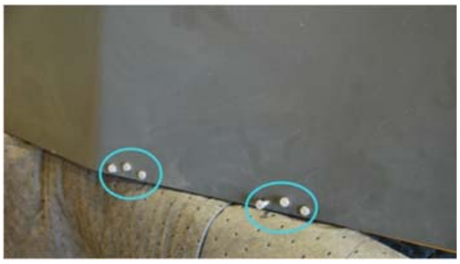
- Remove the cover from the hinges.



- Lay down the cover/cover brace assembly on a table or on a bench.



- Remove the bolts from the cover and the cover brace.



- With a drill 20 mm (3/16 in) in and a drilling machine, remove the rivets from the cover.

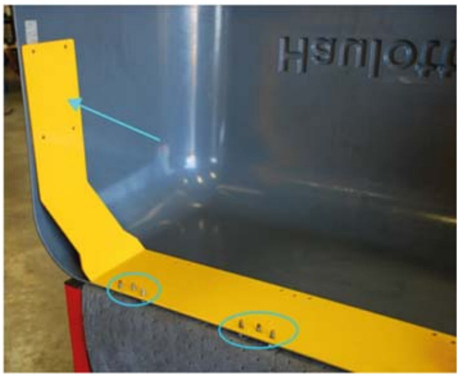


- Remove the cover brace from the cover.



### 21.7 - Re-installation

- After completing the needed operation, operate in the reverse order, such as reassemble the cover.
- Check the bolt thread.
- Replace all the anti-loosening nuts by new ones.
- Such as reassemble the cover, put the cover brace and the bolts in their initial position in the cover.



- With a rivet gun and pop rivets, fix the cover and the cover brace together.
- Then, fix the assembly with the hinges and put the gas spring.

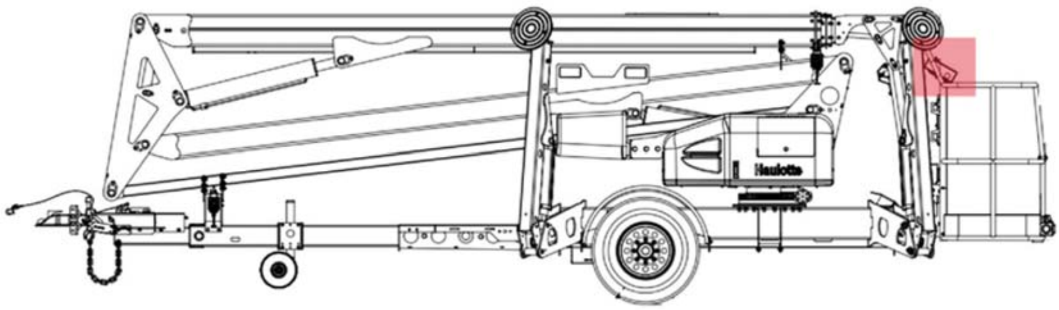


### 21.8 - Pre-operation inspection

- Open and close the cover.

# 22 - Procedure to remove platform control box

## 22.1 - Concerned area




## 22.2 - Description

Procedure to remove platform control box ; Emergency stop button ; Circuit board and Switch Activating Disks.

It is important that the person performing the work on the machine knows all the relative safety information contained in the instruction manual.

**Only an authorized and qualified technician can work on HAULOTTE® machines.**

- Number of persons required : 1

Necessary parts :
- Emergency Stop Button with Contact and Mount - B01-02-0119
- 19x Switch Activating Disks - B01-10-0341

### 22.3 - SAFETY PRECAUTIONS

- **The technician should take all steps to protect themselves or others against all risks of injury related to this intervention.**
- **The technician should ensure that suitable PPE (personal protective equipment) for the job is used, and check the particular conditions of environment in which the material can be found (see safety information specific to the operation site).**
- **Position the machine on a flat ground, stabilized and in a released environment.**
- **Mark out the work area.**
- **Turn key to OFF position. Remove key. Unplug master battery disconnect.**
- **Place a `DO NOT USE' label near the start/stop contactor (key switch) to inform personnel that interventions are currently underway on the equipment.**
- **The pressure in the hydraulic system is very important. It can cause accidents. Relieve the pressure before any intervention and never search for oil leaks using your hands.**
- **Attention to the risks of burns, the hydraulic system works at high temperatures.**
- **The exhaust fumes of engines contain harmful products of combustion. Only start and run the engine in a well ventilated area. When operating in a closed room, use suitable system to evacuate the exhaust to the outside.**

### 22.4 - TOOLS REQUIRED

- PPE (Personal Protective Equipment: Safety shoes, gloves, glasses...... etc.)
- Wrench or nut driver 7 mm (9/32 in)
- Cross-headed screwdriver

## 22.5 - Procedure to remove platform control box

- Place the machine on flat and firm ground.
- Mark out the area of intervention.
- Cut the contact, to remove the key, open the battery cut if fitted.
- Place a `DO NOT USE' label near the start/stop contactor (key switch) to inform personnel that interventions are currently underway on the equipment.




- Identify the platform control box and the wire which link it with the machine.



- Release the wire from the rewinder.



- Unscrew the plug connector between the platform control box and the machine.



- Unplug the control box's wire from the machine.



- Release the latch on the back of the platform control box.



- Lift the control box from the platform's support.

**For ergonomic and safety position, the operator has to be on the platform.**



- Remove the control box from the platform.
- Check that the wire can be removed safely.

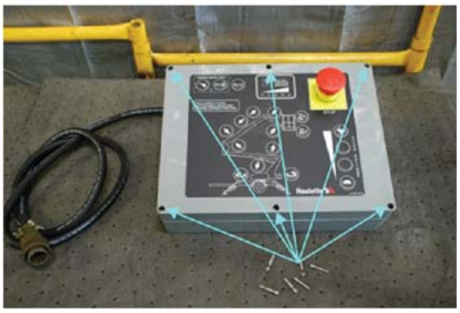


## 22.6 - Procedure to remove the emergency stop button

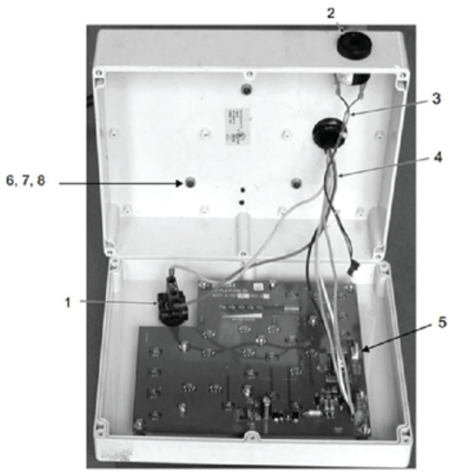
- Lay down the control box on a flat and stable surface.



- Take a cross - headed screwdriver.
- Unscrew the 6 fixing screws.
- Do not lose the fixing screws.



- Gently separate the upper and the lower parts of the control box.
- Identify each wire function.



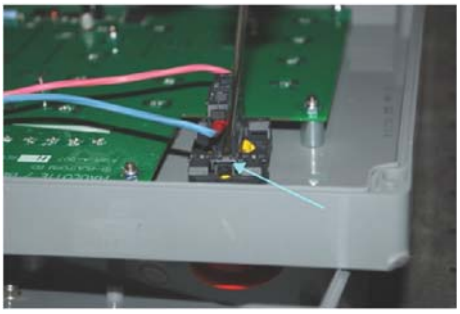

| Item | Part number | Description |
|---|---|---|
| 1 | B01-02-0119 | Emergency stop button with contact and mount |
| 2 | B01-10-0194 | Alarm |
| 3 | B01-01-0153 | Wiring harness ; Alarm |
| 4 | B01-01-0154 | Wiring harness ; Tail ; Upper control box |
| 5 | B01-10-0340 | Circuit board ; Upper |
| 6 | A-00462 | Spool - Not shown |
| 7 | 0096-0006 | Screw ; Flat head socket cap - M6 x 25 |
| 8 | 0096-0039 | Hex nut with nylon insert, - M6 |
| 9 | A-00713-D | Decal ; Platform (upper) control box overlay |
| 10 | B01-10-0341 | Switch activating disk - Not shown |
| 11 | B01-10-0400 | Standoff ; Circuit board - Not shown |

- Such as to manipulate easier the device, unplug the wire ( 3 ).

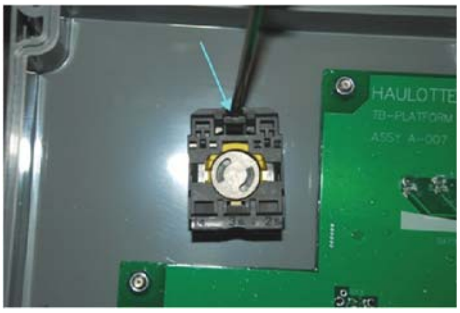
**Keep in mind its initial position.**



- Pull the trigger of the Emergency Stop Button ( 1 ) , such as to unplug the contactor.



- Pull the second trigger, such as to unplug the mount of the Emergency Stop Button ( 1 ).




- Unscrew the clamping ring of the emergency stop button ( 1 ).




- Remove the emergency stop button ( 1 ) from the upper part of the control box.

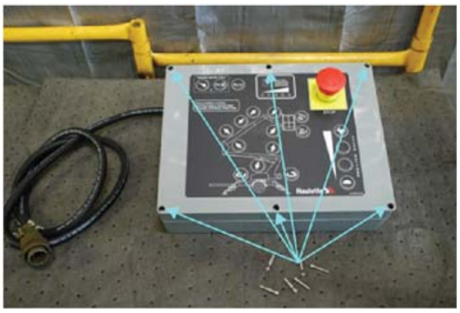


## 22.7 - PROCEDURE TO REMOVE THE SWITCH ACTIVATING DISKS

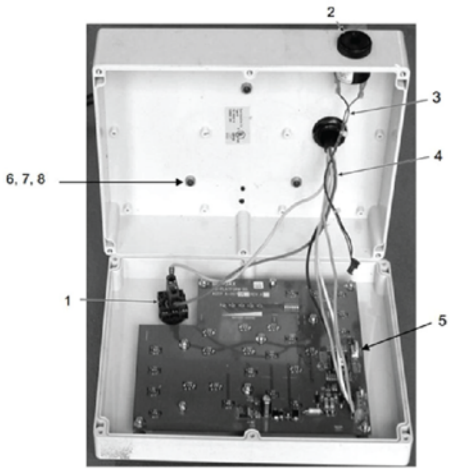
- Lay down the control box on a flat and stable surface.



- Take a cross - headed screwdriver.
- Unscrew the 6 fixing screws.
- Do not lose the fixing screws.



- Gently separate the upper and the lower parts of the control box.
- Identify each wire function : For details refer to the table above.

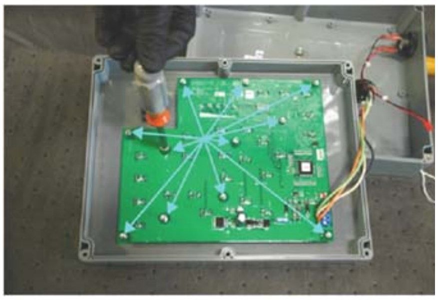



- Such as to manipulate easier the device, unplug the wire ( 3 ) and the contactor ( 1 ).



**Keep in mind its initial position.**

- Unscrew the 11 nuts of the Circuit Board ;
- Take a wrench or a nut driver 7 mm(9/32 in)



- Lift and lay down carefully the circuit board on the lower part of the control box.



- The 19 switch activating disks are available.



## 22.8 - RE-INSTALLATION

- After completing the needed operation, operate in the reverse order, such as reassemble the control box.



**Check that the wire ( 3 ) and the Emergency Stop Button ( 1 ) contactor are well plugged. For details refer to the table above.**

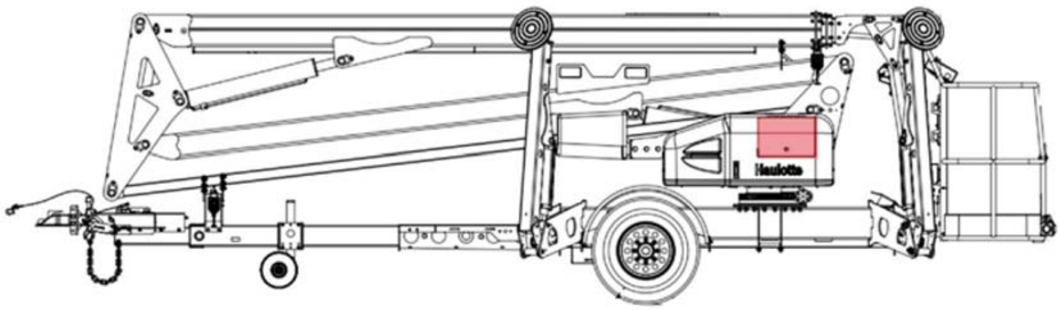
**Verify that the seal ring is well located in its housing.**

## 22.9 - PRE-OPERATION INSPECTION

- Switch on the contact key.
- Extend in auto level mode, get on the platform and test the control box such as to check that the machine is functioning properly.

# 23 - Ground control box removal procedure

## 23.1 - Concerned area



## 23.2 - Description

Procedure to remove ground control box, emergency stop button, circuit board and switch activating disks.

It is important that the person performing the work on the machine knows all the relative safety information contained in the instruction manual.

**Only an authorized and qualified technician can work on HAULOTTE® machines.**

- Number of persons required : 1

Necessary parts :
- Emergency stop button with contact and mount : B01-02-0119 - Number : 1
- Switch activating disk : B01-10-0342 - Number : 25
- CPU board : B01-10-0338 - Number : 1
- Driver board : B01-10-0339 - Number : 1
- Ground control box complete : A-00712 - Number : 1

### 23.3 - Safety precautions

- **The technician should take all steps to protect themselves or others against all risks of injury related to this intervention.**
- **The technician should ensure that suitable PPE (personal protective equipment) for the job is used, and check the particular conditions of environment in which the material can be found (see safety information specific to the operation site).**
- **Position the machine on a flat ground, stabilized and in a released environment.**
- **When using a Telehandler, always cordon off the area areound the base of the Telehandler to keep personnel and other moving equipment away from the Telehandler while in use.**
- **Turn key to OFF position. Remove key. Unplug master battery disconnect.**
- **Place a `DO NOT USE' label near the start/stop contactor (key switch) to inform personnel that interventions are currently underway on the equipment.**
- **The pressure in the hydraulic system is very important. It can cause accidents. Relieve the pressure before any intervention and never search for oil leaks using your hands.**
- **Attention to the risks of burns, the hydraulic system works at high temperatures.**
- **The exhaust fumes of engines contain harmful products of combustion. Only start and run the engine in a well ventilated area. When operating in a closed room, use suitable system to evacuate the exhaust to the outside.**

### 23.4 - Tools required

- PPE (Personal Protective Equipment: Safety shoes, gloves, glasses...... etc.).
- Phillips screwdriver.
- 1 wrench 10 mm (metric size).
- 1 Allen wrench 2.4 mm (3/32 in).
- 1 nut driver 7 mm (9/32 in).
- 1 nut driver 6 mm (1/4 in).

## 23.5 - Procedure removal ground control box

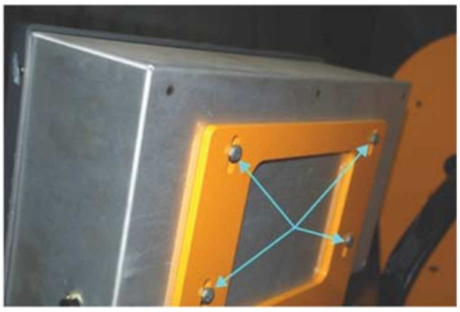
- Place the machine on flat and firm ground. Mark out the area of intervention.
- Turn the key switch to the OFF position and remove the key. Unplug the battery disconnect before performing operation.
- Place a `DO NOT USE' label near the start/stop contactor (key switch) to inform personnel that interventions are currently underway on the equipment.




- Open the cover above the ground control box. Unplug the 5 wires which link the control box with the machine.

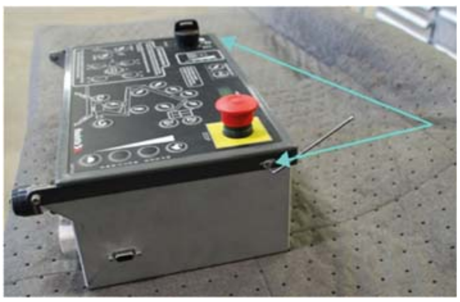


- With a wrench 10 mm (metric size), unscrew the 4 bolts which lock the control box on its mount.
- Lay down the control box on a flat and stable surface.

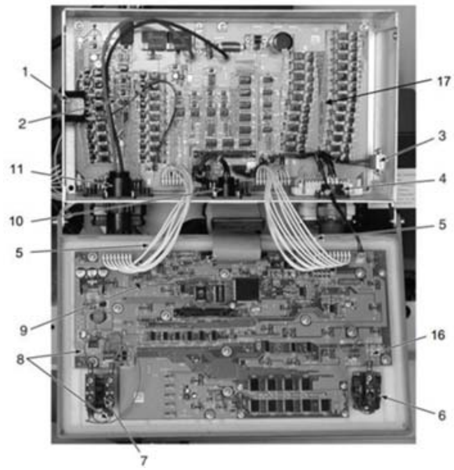


## 23.6 - Procedure to remove the emergency stop button

- With an allen wrench 2.4 mm (3/32 in), unscrew the two bolts on the side of the box.

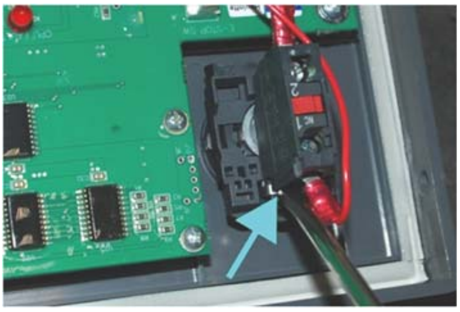


- Lift carefully the upper part of the control box. Identify each wire function.




| Item | Part number | Description | Quantity |
|---|---|---|---|
| | A-03546 | Ground control box complete | 1 |
| 1 | B01–10–0194 | Alarm | 1 |
| 2 | B01–01–0147 | Wiring harness ; Alarm | 1 |
| 3 | B01–01–0152 | Wiring harness ; DB9 | 1 |
| 4 | B01–01–0145 | Wiring harness ; Communication | 1 |
| 5 | B01–01–0149 | Wiring harness ; MTA | 2 |
| 6 | B01–02–0119 | Emergency stop button with contact and mount | 1 |
| 7 | B01–02–0118 | Key Switch ; 3 Position | 1 |
| 8 | B01–01–0150 | Wiring harness ; Key Switch ; Emergency stop | 1 |
| 9 | B01–01–0151 | Ribbon cable | 1 |
| 10 | B01–01–0146 | Wiring harness ; Communication | 1 |
| 11 | B01–01–0148 | Wiring harness ; Power | 1 |
| 12 | A-00712–D | Decal ; Ground control box overlay | 1 |
| 12A | A-00712–L | Lid with decal only - Not shown | 1 |
| 12B | A-00682–D | Decal ; Control box overlay | 1 |
| 13 | B01–10–0342 | Switch activating disk - Not shown | 25 |
| 14 | B01–10–0400 | Standoff ; Circuit board - Not shown | 17 |
| 15 | B38–00–0001 | Key ; Replacement - Not shown | 1 |
| 16 | B01–10–0338 | CPU board - Attached to lid | 1 |
| 17 | B01–10–0339 | Driver board - Attached to box | 1 |

- Lift the tab of the contact to separate it from the mount.



- Lift the tab of the mount to separate it from the button (6).



- Unscrew the clamping ring of the emergency stop button ( 6 ).

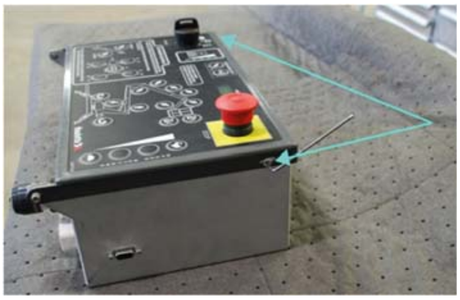


- Remove the emergency stop button ( 6 ) from the upper part of the control box.

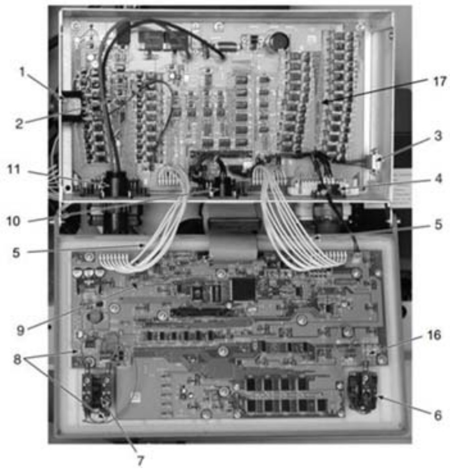


## 23.7 - Procedure to remove the switch activating disks

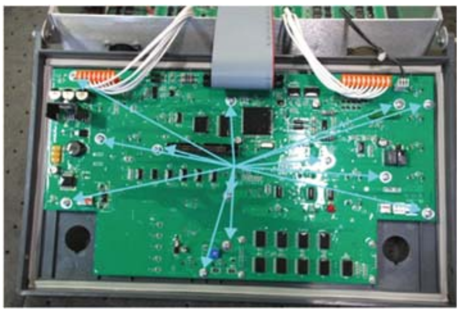
- With an allen wrench 2.4 mm (3/32 in), unscrew the two bolts on the side of the box.



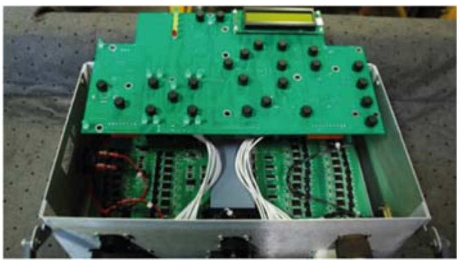
- Lift carefully the upper part of the control box. Identify each wire function : For details refer to the table above.



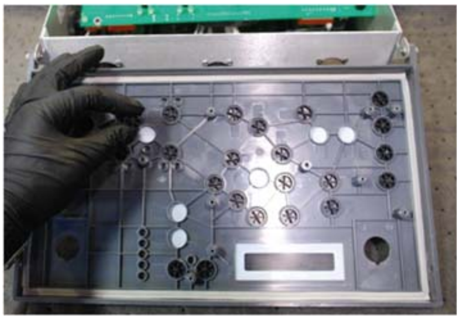

- Unscrew the 13 screws of the circuit board; take a Phillips screwdriver.



- Lift and lay down carefully the circuit board on the lower part of the control box.

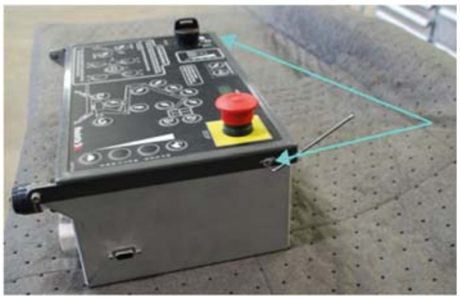


- The 25 switch activating disks are available. Change those that are out of order.

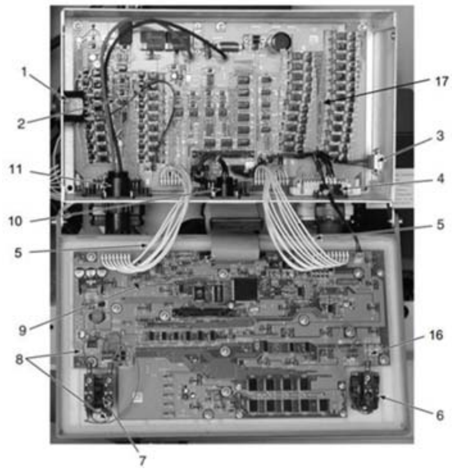


## 23.8 - Procedure to remove the CPU circuit board

- With an allen wrench 2.4 mm (3/32 in), unscrew the two bolts on the side of the box.

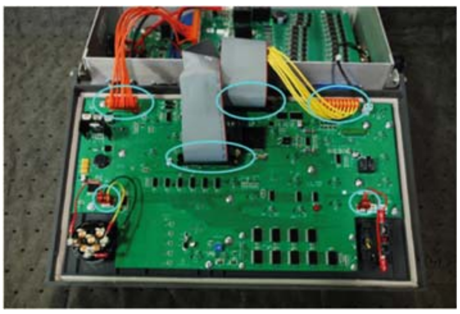


- Lift carefully the upper part of the control box. Identify each wire function : For details refer to the table above.

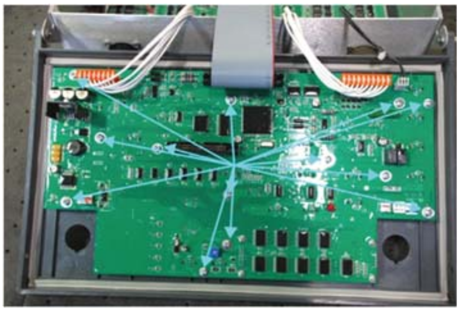



- Disconnect the connecting wires from the CPU circuit board.

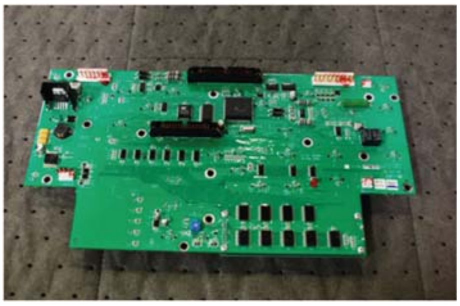
**Keep in mind their positions.**



- Unscrew the 13 screws of the circuit board; take a Phillips screwdriver.

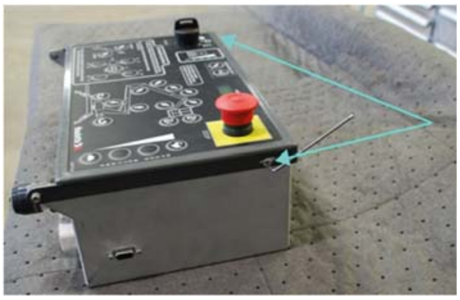


- Lift and lay down carefully the circuit board on a bench.

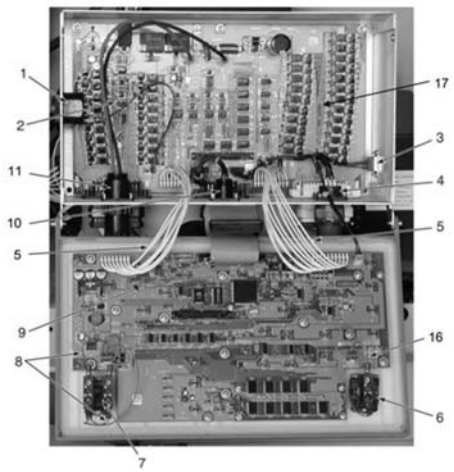


### 23.9 - Procedure to remove the driver circuit boards

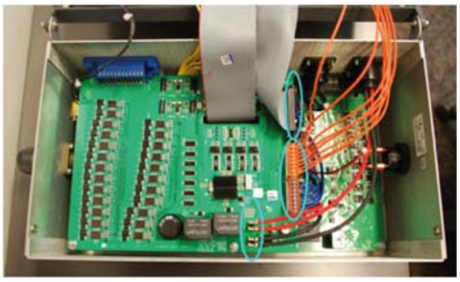
- With an allen wrench 2.4 mm (3/32 in), unscrew the two bolts on the side of the box.



- Lift carefully the upper part of the control box. Identify each wire function : For details refer to the table above.

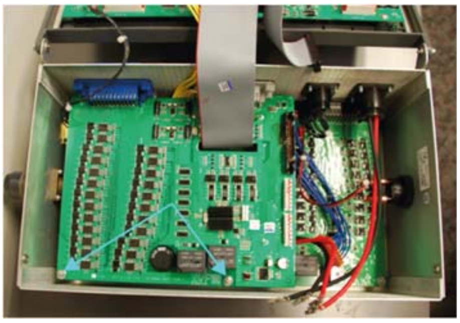


- Disconnect the connecting wires from the upper driver circuit board.

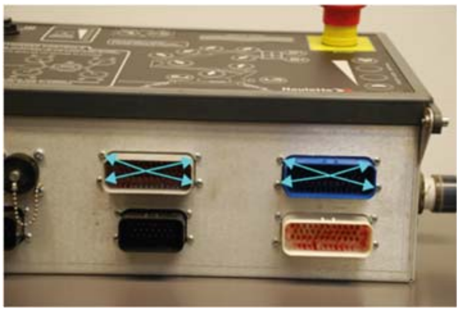


**Keep in mind their positions.**

- Unscrew the two nuts of the upper driver circuit board; take a wrench or a nut driver 7 mm (9/32 in).



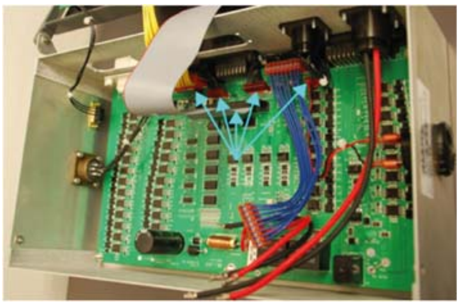
- Unscrew the 8 connector's screws of the upper driver circuit board; take a Phillips screwdriver.



- Lift and lay down carefully the upper driver circuit board on a bench.

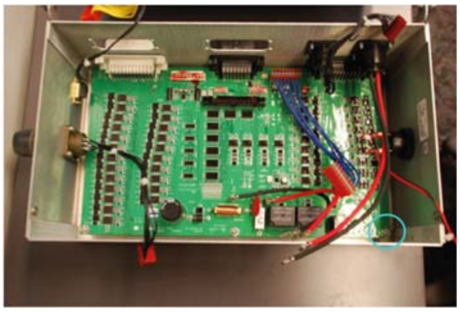


- Disconnect the connecting wires from the lower driver circuit board.

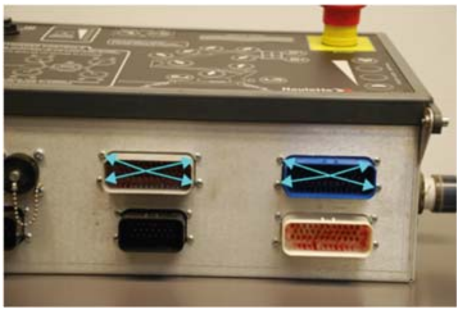


**Keep in mind their positions.**

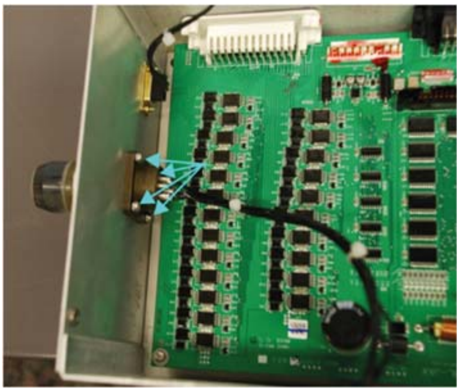
- Unscrew the nut of the lower driver circuit board; take a wrench or a nut driver 7 mm (9/32 in).



- Unscrew the 12 connector's screws of the lower driver circuit board; take a Phillips screwdriver.



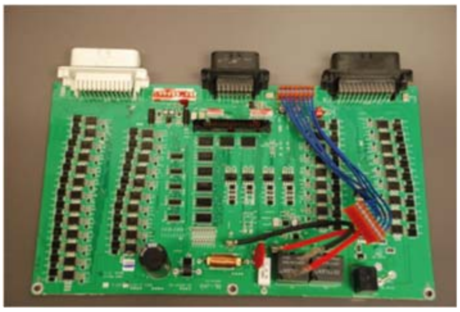
- With a Philips screwdriver and a nut driver 6 mm (1/4 in), unscrew the bolts of the DB9.



- Remove the DB9 connector.

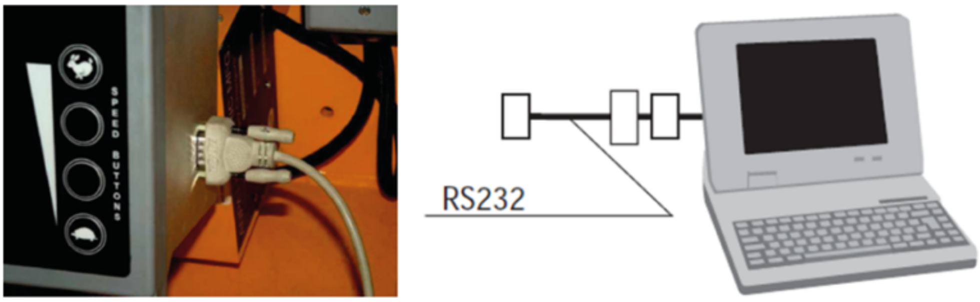


- Lift and lay down carefully the upper driver circuit board on a bench.



## 23.10 - Re-installation

- After completing the needed operation, operate in the reverse order, such as reassemble the ground control box.
- Check the bolt thread.
- After replacing the CPU circuit board, a configuration is necessary.
- See the following instructions :
- Connect the laptop with a RS232 serial cable male/female (same as for MJX cable) to the ground control box on Sub D9 points plug as shown below: (an RS232/USB adapter can be used).



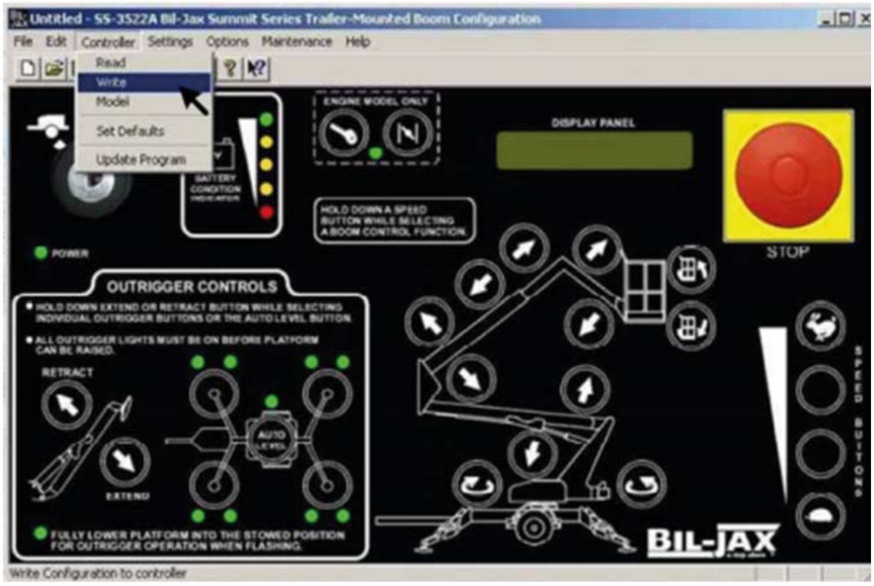

- Then open the latest configuration program version.
- Then click on ENTER.



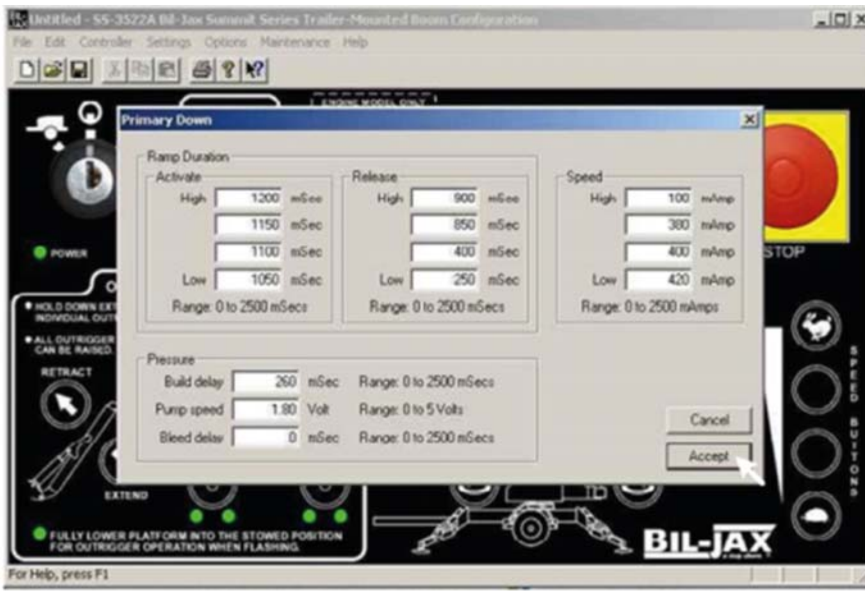

- Go to controller/read.
- Go to options and highlight the options that the machine has.



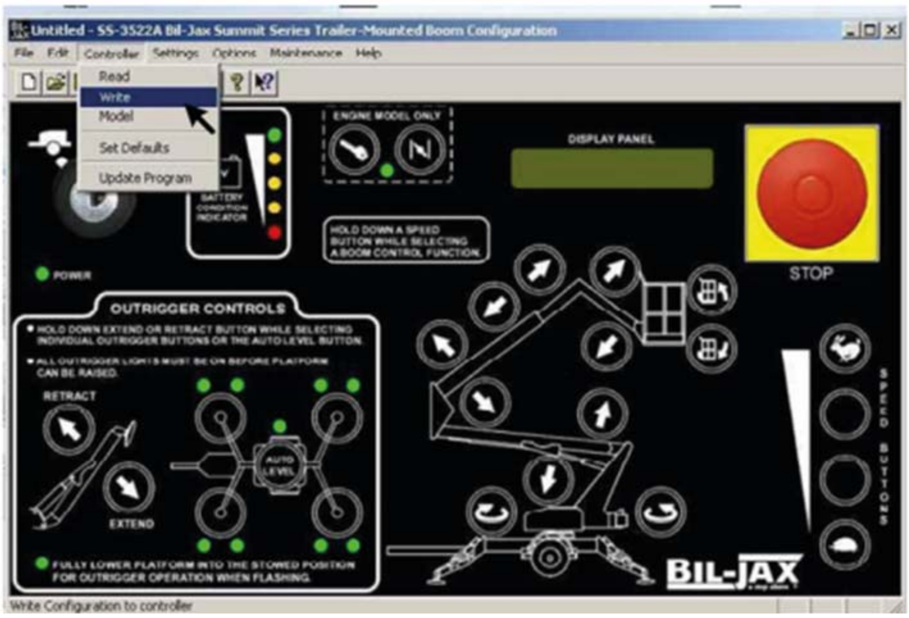
- After selecting all of the options that the machine has on it.
- Go to controller/write.
- This will enable the options you have selected.




- Go through the boom functions that you wrote down before loading the new program and put in the values that were in before.
- Build delay and pump speed for : Primary boom Up and Down ; Secondary boom Up and Down ; Jib boom Up and Down.
- Speed values for : Primary boom Down ; Secondary boom Down ; Jib boom Down.
- After putting in the values, click on accept.



- Then click on controller/write.
- This will write the values you have changed back to the control box.
- Without doing this the values will not be put into the control box.

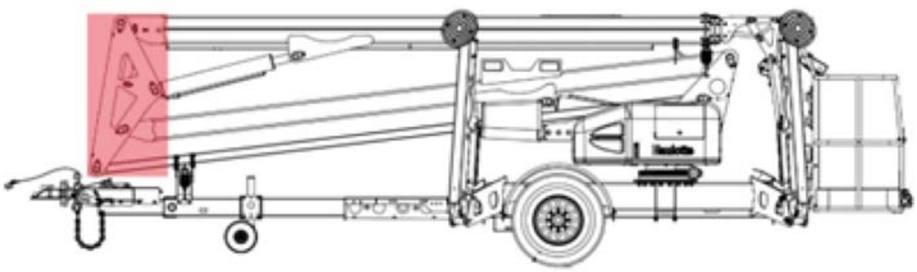



### 23.11 - Pre-operation inspection

- Switch on the contact key.
- Test all the functionalities of the ground control box such as check that the machine is functioning properly.

# 24 - Knuckle removal procedure

## 24.1 - Concerned area



## 24.2 - Description

Procedure to remove the knuckle.

It is important that the person performing the work on the machine knows all the relative safety information contained in the instruction manual.

**Only an authorized and qualified technician can work on HAULOTTE® machines.**

- Number of persons required : 2

Necessary parts :
- Hex nut with nylon insert, M10 : 0096-0041 - Number : 6
- Grease NLGI grade 2 (see the following grease requirements) : B05-09-0001 - Number : 1

| **Grease** | |
|---|---|
| Thicker Type | Lithium Complex |
| Dropping Point | 215°C (419°F) minimum |
| Consistency | NLGI No. 2 |
| Additives | EP, Corrosion & Oxidation Inhibitors |
| Viscosity Index | 80 minimum |
| **Approved Grease Sources** | |
| ConocoPhillips / 76 Lubricants / Kendall | Multiplex RED #2<br>L427 Super Blu Grease |
| Citgo | Lithoplex MP #2<br>Lithoplex CM #2<br>Mystik JT-6 Hi-Temp Grease #2 |
| Exxon / Mobil Company | Ronex, MP<br>Mobilith AW 2<br>Mobil I Synthetic Grease |
| Oil Center Research of Oklahoma | Liquid-O-Ring No. 167L |
| Pennzoil-Quaker State Company | Synthetic Red Grease |
| Shell | ALBIDA EP 2<br>ALBIDA Grease SLC 220<br>Rotella Heavy Duty Lithium Complex #2 |
| Royal Manufacturing Company | Royal 98 Lithium Complex EP #2 |
| Chevron Texaco | Chevron Ulti-Plex Grease EP #2<br>Texaco Starplex Moly MPGM #2 |
| Valvoline | Valvoline Multi-Purpose GM<br>Valvoline Durablend |
| Great Plans Lubricants | Lithium Complex EP #2 |
| Chem Arrow | Arrow 2282 |

## 24.3 - SAFETY PRECAUTIONS

- **The technician should take all steps to protect themselves or others against all risks of injury related to this intervention.**
- **The technician should ensure that suitable PPE (personal protective equipment) for the job is used, and check the particular conditions of environment in which the material can be found (see safety information specific to the operation site).**
- **Position the machine on a flat ground, stabilized and in a released environment.**
- **When using a Telehandler, always cordon off the area areound the base of the Telehandler to keep personnel and other moving equipment away from the Telehandler while in use.**
- **Turn key to OFF position. Remove key. Unplug master battery disconnect.**
- **Place a `DO NOT USE' label near the start/stop contactor (key switch) to inform personnel that interventions are currently underway on the equipment.**
- **The pressure in the hydraulic system is very important. It can cause accidents. Relieve the pressure before any intervention and never search for oil leaks using your hands.**
- **Attention to the risks of burns, the hydraulic system works at high temperatures.**
- **The exhaust fumes of engines contain harmful products of combustion. Only start and run the engine in a well ventilated area. When operating in a closed room, use suitable system to evacuate the exhaust to the outside.**

## 24.4 - TOOLS REQUIRED

- PPE (Personal Protective Equipment: Safety shoes, gloves, glasses...... etc.).
- 2 lifting devices minimum capacity of 2000 Kg (4409 lbs) each.
- 2 Straps 2000 Kg (4409 lbs).
- Ratchet strap.
- Hammer.
- Punch diameter 3 mm (1/8 in) and length 300 mm (12 in).
- 2 wrenches 26 mm (11/16 in).
- Torque wrench.

### 24.5 - Procedure to remove the wires from the jib boom

- Place the machine on flat and firm ground. Mark out the area of intervention.
- Turn the key switch to the OFF position and remove the key. Unplug the battery disconnect before performing operation.
- Place a `DO NOT USE' label near the start/stop contactor (key switch) to inform personnel that interventions are currently underway on the equipment.




Section D 12.4.3 - Secondary lift cylinder

Section D 24 - Hoses removal procedure

Section F 25 - Wiring harness removal procedure

- With a lifting device and 2 straps 2000 Kg (4409 lbs), lift the upper lift cylinder.
- With 2 wrenches 26 mm (11/16 in), remove the pin retainers of the of the upper lift cylinder locks with the knuckle.
- With a hammer and a punch, remove the pin.
- Lift the upper lift cylinder and lay down it on wood blocks.






**Keep attention during lifting.**

- With a lifting device and a strap 2000 Kg (4409 lbs), lift the upper part of knuckle.



- Put a jack stand or a wood block at the back of the machine.

**The machine can tilt after the knuckle is removed.**



- With 2 wrenches 26 mm (11/16 in), remove the pin retainers of the primary boom and the lower link.




- Lift the knuckle and lay down it on wood blocks.

**Keep attention during lifting.**



## 24.6 - Re-installation

- After completing the needed operation, operate in the reverse order, such as reassemble the knuckle.
- Check the bolt thread.
- Replace all the anti-loosening nuts by new ones.
- Tighten the bolts and nuts until those following torque requirements(Do not exceed those requirements) :

| Wrench size | Torque |
|---|---|
| 11 mm (7/16 in) | 10 Nm (8 ft.lbs) |
| 13 mm (1/2 in) | 23 Nm (17 ft.lbs) |
| 27 mm (11/16 in) | 67 Nm (50 ft.lbs) |
| 19 mm (3/4 in) | 101 Nm (75 ft.lbs) |
| 21 mm (13/16 in) | 149 Nm (110 ft.lbs) |
| 22 mm (7/8 in) | 149 Nm (110 ft.lbs) |
| 23 mm (15/16 in) | 203 Nm (150 ft.lbs) |

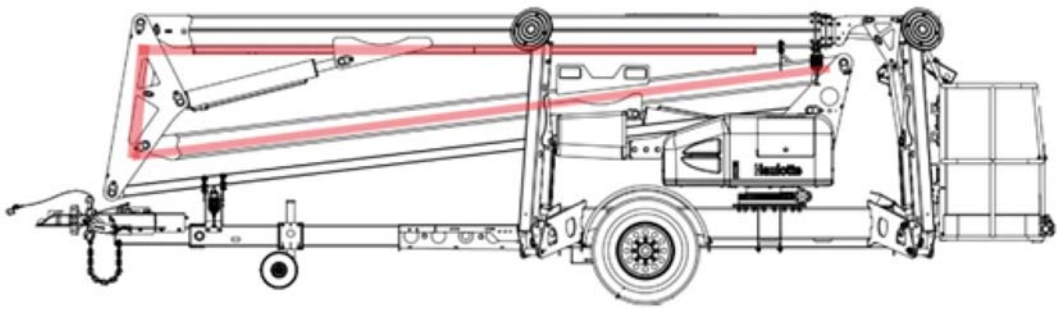
- Put grease NLGI grade 2 on the removed pins.

## 24.7 - Pre-operation inspection

- Switch on the contact key.
- Extend in auto level mode the outriggers.
- Extend theprimary boom and the secondary boom such as check that the machine is functioning properly.

# 25 - Hoses removal procedure

## 25.1 - Concerned area



## 25.2 - Description

Procedure to remove the hoses.

It is important that the person performing the work on the machine knows all the relative safety information contained in the instruction manual.

**Only an authorized and qualified technician can work on HAULOTTE® machines.**

- Number of persons required : 2

Necessary parts :
- Hoses references-Refer to the spare parts catalog : 3522A - HTA13P
- Hoses references-Refer to the spare parts catalog : 4527A - HTA16P
- Hoses references-Refer to the spare parts catalog : 5533A - HTA19P
- Hydraulic oil can 18.9 l(5 gal US) :  HVI AW32 or equivalent with a minimum viscosity rating of  175.

## 25.3 - SAFETY PRECAUTIONS

- **The technician should take all steps to protect themselves or others against all risks of injury related to this intervention.**
- **The technician should ensure that suitable PPE (personal protective equipment) for the job is used, and check the particular conditions of environment in which the material can be found (see safety information specific to the operation site).**
- **Position the machine on a flat ground, stabilized and in a released environment.**
- **When using a Telehandler, always cordon off the area areound the base of the Telehandler to keep personnel and other moving equipment away from the Telehandler while in use.**
- **Turn key to OFF position. Remove key. Unplug master battery disconnect.**
- **Place a `DO NOT USE' label near the start/stop contactor (key switch) to inform personnel that interventions are currently underway on the equipment.**
- **The pressure in the hydraulic system is very important. It can cause accidents. Relieve the pressure before any intervention and never search for oil leaks using your hands.**
- **Attention to the risks of burns, the hydraulic system works at high temperatures.**
- **The exhaust fumes of engines contain harmful products of combustion. Only start and run the engine in a well ventilated area. When operating in a closed room, use suitable system to evacuate the exhaust to the outside.**

## 25.4 - TOOLS REQUIRED

- PPE (Personal Protective Equipment: Safety shoes, gloves, glasses...... etc.).
- 2 lifting devices minimum capacity of 2000 Kg (4409 lbs) each.
- 2 Straps 2000 Kg (4409 lbs).
- Ratchet strap.
- Pair of cutting pliers.
- Screwdrivers.
- Hammer.
- Punch diameter 3 mm (1/8 in) and length 300 mm (12 in).
- 1 wrench 24 mm (15/16 in).
- 1 wrench 16 mm (5/8 in).
- 1 wrench 21 mm (13/16 in).
- 2 wrenches 10 mm (metric size).
- 2 wrenches 26 mm (11/16 in).
- Hoses caps and plugs.

## 25.5 - Procedure to remove the hoses from the jib boom

- Place the machine on flat and firm ground. Mark out the area of intervention.
- Turn the key switch to the OFF position and remove the key. Unplug the battery disconnect before performing operation.
- Place a `DO NOT USE' label near the start/stop contactor (key switch) to inform personnel that interventions are currently underway on the equipment.




Section D 13 - Basket removal procedure

- With a lifting device and a strap  2000 kg (4.409 lbs), lift the jib the lower part of the jib boom.

**Keep attention during lifting.**



- With two wrench  10 mm (metric size), unscrew the three bolts of the jib hose clamps.

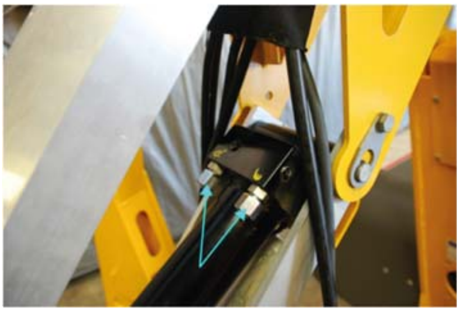


- With a pair of cutting pliers, cut the zip tie around the jib cylinder such as release the hoses.



- With a wrench 21 mm (13/16 in) and a wrench 19 mm (3/4 in), disconnect the jib cylinder hoses.
- Put caps and plugs to avoid oil leaks.
- Mark out the extension and the return position on the cylinder.

**Oil can spurt, wear safety glasses.**



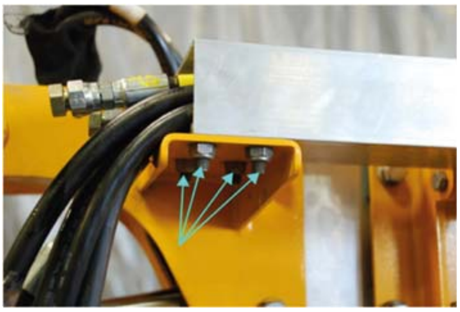
- Release the wires and hoses from the jib. With a wrench 26 mm (11/16 in) in and a wrench 16 mm (5/8 in), disconnect the slave cylinder hoses.
- Put caps and plugs to avoid oil leaks.

**Oil can spurt, wear safety glasses.**



### 25.6 - Procedure to remove the hoses from the secondary boom

- With two wrenches 12 mm (1/2 in), unscrew the bolts of the slide tube.



- Open the loop part of the cable track in its stowed position.



- Pull the hoses from the inside of the slide tube.



- To be easier for the following operations, attach together the hoses with tape.



- With a pair of cutting pliers, cut the zip tie which links the rear lights wire.
- Pull the hoses from the inside of the track.



- Pull the hoses from the inside of the lower tube of the secondary boom.



- With a wrench 21 mm (13/16 in), disconnect the extension (telescopic) cylinder hoses.
- Put caps and plugs to avoid oil leaks.
- Mark out the extension and the return position on the cylinder.

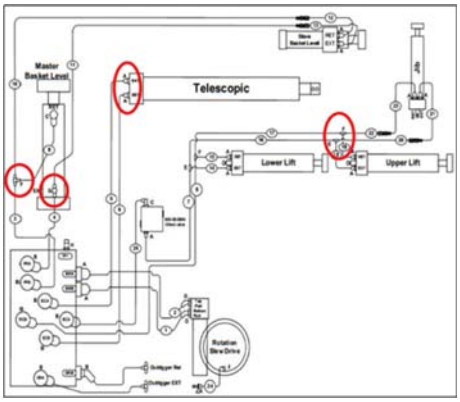
**Oil can spurt, wear safety glasses.**



## 25.7 - PROCEDURE TO REMOVE THE HOSES FROM THE PRIMARY BOOM

- Inside the knuckle, with a wrench  21 mm (13/16 in) and a wrench  19 mm (3/4 in), disconnect the hoses return and extension from: the master cylinder, the extension cylinder (telescopic) and the upper lift cylinder.
- Put caps and plugs to avoid oil leaks.
- Mark out the extension and the return position on the cylinder.

**Oil can spurt, wear safety glasses.**




- Extract the hoses from the inside of the knuckle.

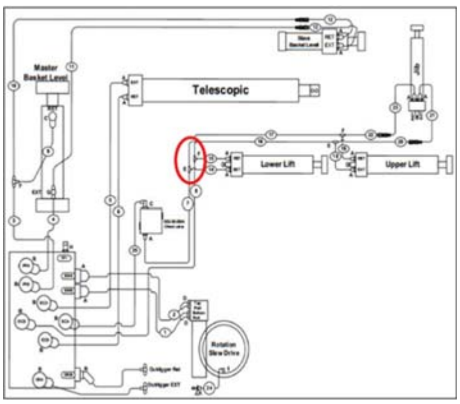


- For an easier access of the inside of the turntable, with two wrench  10 mm (metric size), remove the turntable rear guard.



- Inside the knuckle, with a wrench  21 mm (13/16 in) and a wrench  19 mm (3/4 in), disconnect the hoses return and extension from: the master cylinder, the extension cylinder (telescopic) and the upper lift cylinder.
- Put caps and plugs to avoid oil leaks.
- Mark out the extension and the return position on the cylinder.

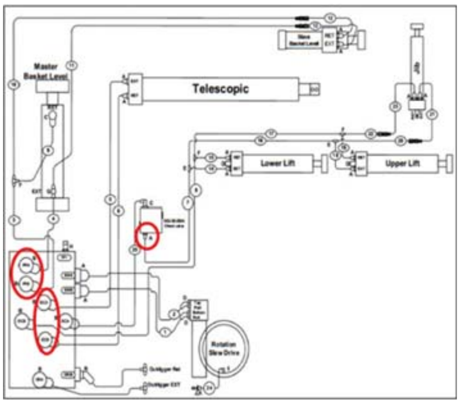
**Oil can spurt, wear safety glasses.**



# D-Maintenance

- In the hydraulic pump compartment, with a wrench 21 mm (13/16 in) and a wrench 19 mm (3/4 in), disconnect the hoses of: the lift cylinders, the jib cylinder, the extension cylinder (telescopic), the master and slave cylinders.
- Put caps and plugs to avoid oil leaks.
- Mark out the extension and the return position on the cylinder.

**Oil can spurt, wear safety glasses.**




- From the extremity of the primary boom (knuckle side), extract the disconnected hoses from the inside of the primary boom.



- Lay down the hoses on the ground.



## 25.8 - RE-INSTALLATION

- This procedure can be used for only one hydraulic hose.
- After completing the needed operation, operate in the reverse order, such as put the hoses back.
- The torque requirement for the hydraulic hoses is  33 Nm (25 ft lbs).
- Refill the hydraulic oil reservoir.




**All the elements of the machine have to be in the stowed position.**

- Hydraulic oil.

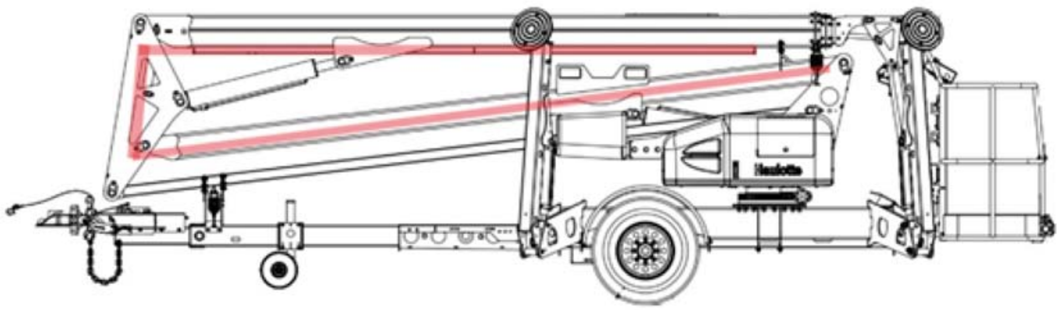
**HVI AW32 or equivalent with a minimum viscosity rating of  175.**

## 25.9 - PRE-OPERATION INSPECTION

- Switch on the contact key.
- Extend in auto level mode the outriggers.
- Extend the extension cylinder, the lift cylinders and the jib cylinder such as check that the machine is functioning properly and refill the cylinders with hydraulic oil.
- Put the machine in stowed position.
- Check the level of the hydraulic oil reservoir..
- Refill if necessary.

# 26 - Wiring harness removal procedure

## 26.1 - Concerned area



## 26.2 - Description

Procedure to remove the wiring harness.

It is important that the person performing the work on the machine knows all the relative safety information contained in the instruction manual.

**Only an authorized and qualified technician can work on HAULOTTE® machines.**

- Number of persons required : 1

Necessary parts :

- Wires references-Refer to the spare parts catalog : 3522A - HTA13P
- Wires references-Refer to the spare parts catalog : 4527A - HTA16P
- Wires references-Refer to the spare parts catalog : 5533A - HTA19P

## 26.3 - Safety precautions

- **The technician should take all steps to protect themselves or others against all risks of injury related to this intervention.**
- **The technician should ensure that suitable PPE (personal protective equipment) for the job is used, and check the particular conditions of environment in which the material can be found (see safety information specific to the operation site).**
- **Position the machine on a flat ground, stabilized and in a released environment.**
- **When using a Telehandler, always cordon off the area areound the base of the Telehandler to keep personnel and other moving equipment away from the Telehandler while in use.**
- **Turn key to OFF position. Remove key. Unplug master battery disconnect.**
- **Place a `DO NOT USE' label near the start/stop contactor (key switch) to inform personnel that interventions are currently underway on the equipment.**
- **The pressure in the hydraulic system is very important. It can cause accidents. Relieve the pressure before any intervention and never search for oil leaks using your hands.**
- **Attention to the risks of burns, the hydraulic system works at high temperatures.**
- **The exhaust fumes of engines contain harmful products of combustion. Only start and run the engine in a well ventilated area. When operating in a closed room, use suitable system to evacuate the exhaust to the outside.**

## 26.4 - Tools required

- PPE (Personal Protective Equipment: Safety shoes, gloves, glasses...... etc.).
- Pair of cutting pliers.
- Screwdrivers.
- 2 wrenches 10 mm (metric size).
- 2 wrenches 12 mm (1/2 in).
- 3 twist-on wire connectors.

## 26.5 - Procedure to remove the wires from the jib boom

- Place the machine on flat and firm ground. Mark out the area of intervention.
- Turn the key switch to the OFF position and remove the key. Unplug the battery disconnect before performing operation.
- Place a `DO NOT USE' label near the start/stop contactor (key switch) to inform personnel that interventions are currently underway on the equipment.




Section F 17.4 - Basket removal procedure

- With a pair of cutting pliers, cut the zip tie which links the rear lights wire.

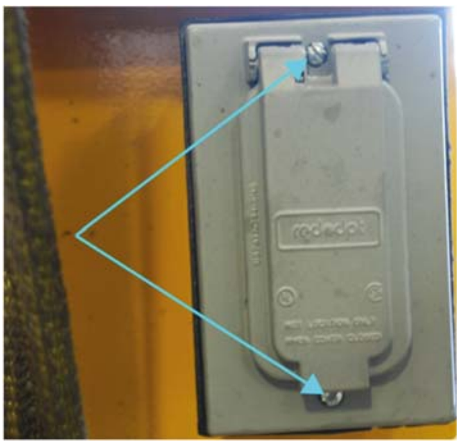


- With a wrench  23 mm (15/16 in), unscrew the ring of the AC power wire

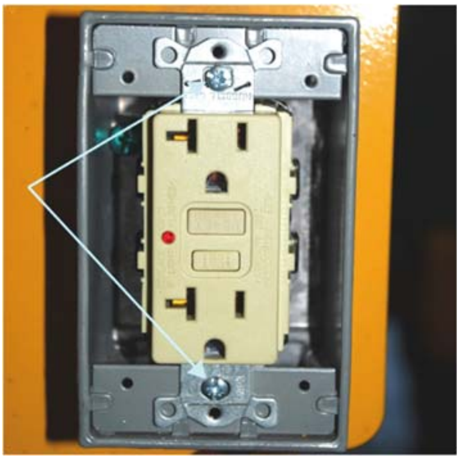


- With a flat screwdriver, remove the screws from the  AC power cover.

**Ensure that the battery disconnect handle is well disconnected.**



- With a Phillips screwdriver, remove the screws which lock the AC power plug.
- Disconnect the AC power wires from the plug.



- Remove the AC power wires from the back of the AC power cover.
- To protect the wires, put electrical tape around each one.



- Disconnect water hoses if fitted on the machine.
- With a lifting device and a strap 2000 kg (4.409 lbs), lift the jib the lower part of the jib boom.



- With two wrench 10 mm (metric size), unscrew the three bolts of the jib hose clamps.



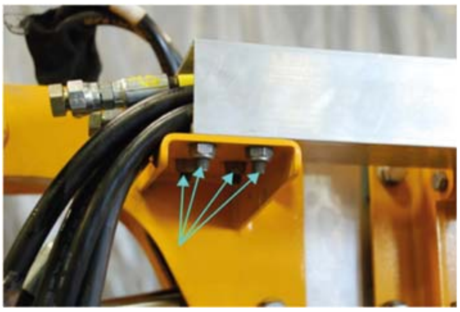
- With a pair of cutting pliers, cut the zip tie around the jib cylinder such as release the jib cylinder wire.
- Disconnect the jib cylinder wire.

**Oil can spurt, wear safety glasses.**



## 26.6 - PROCEDURE TO REMOVE THE WIRES FROM THE SECONDARY BOOM

- With two wrenches 12 mm (1/2 in), unscrew the bolts of the slide tube.



- Open the loop part of the cable track in its stowed position.



- Pull the wires from the inside of the slide tube.



- To be easier for the following operations, attach together the wires.



- At the extremity of the track, cut the zip ties which attach the wires and the hoses.
- Pull the wires from the inside of the track.

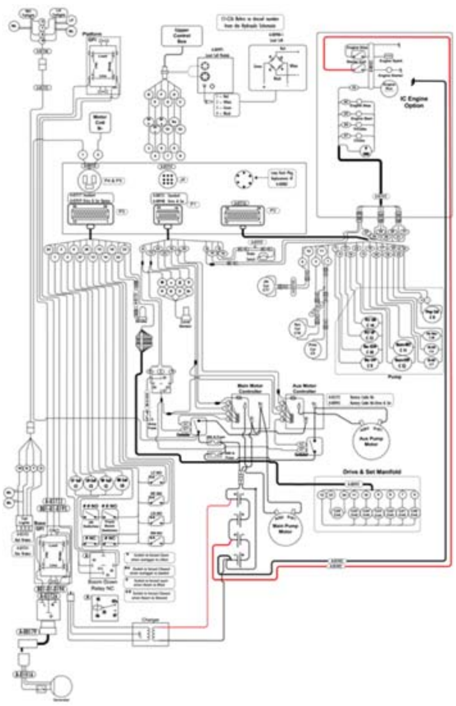


- Pull the wires from the inside of the lower tube of the secondary boom.



## 26.7 - Procedure to remove the wires from the primary boom

- To disconnect wires, refer to the Electrical Diagrams in this manual.



- Inside the knuckle, unplug the upper lift cylinder wires.



- At the back of the turntable, disconnect the rear lights wire.



- In the ground control compartment, disconnect the jib cylinder and the upper lift cylinder.



- Under the ground control box, disconnect the platform to ground control wire.



- In the ground control compartment, with a flat screwdriver, open the AC power box.




- With a pair of cutting pliers, remove the wires crimping such as release the AC power cable from the inside of the primary boom.



- From the extremity of the primary boom (knuckle side), extract the disconnected wires from the inside of the primary boom.



### 26.8 - Re-installation

- This procedure can be used for only one wire.
- After completing the needed operation, operate in the reverse order, such as put the wires back.
- To reassemble the AC power wires, use twist-on wire connectors.



### 26.9 - Pre-operation inspection

- Switch on the contact key.
- Extend in auto level mode the outriggers.
- Get on the platform and test all the functionalities of the machine.
- Test the AC power on the ground and on the platform.

# 27 - Material safety

The following Material Safety Data Sheets describe the correct procedures for the safe handling of chemical components, as well as any potential health and safety hazards related to these chemicals. Material Safety Data Sheets are included here in accordance with applicable federal and state regulations. Read and observe all safety precautions. Maintain awareness of potential health and safety hazards.

## 27.1 - Material safety data sheet - Lead acid batteries, wet, filled with acid - UN 2794

CHEMTREC CODE: C677

### SECTION I: GENERAL INFORMATION

Manufacturers Name: Crown Battery Mfg. Company
Street Address: 1445 Majestic Drive
City, State, Zip: Fremont, Ohio 43420
Phone Number; 419 334-7181
Revision Date: 03/01/08

For Chemical Emergency
Spill Leak Fire Exposure or Accident
Call CHEMTREC Day or Night
DOMESTIC NORTH AMERICA 800-424-9300
INTERNATIONAL, CALL 703-527-3887
(collect calls accepted)

### SECTION II: MATERIAL IDENTIFICATION AND INFORMATION

| COMPONENTS<br>Hazardous Components<br>1% or greater<br>Carcinogens 0.01 % or greater | PERCENT | OSHA PEL | ACGIH TLV | OTHER LIMITS | CAS NUMBER |
|---|---|---|---|---|---|
| METALLIC METAL ALLOY | 25.5% | 0.05mg/m3 | .05 mg/m3 | NONE | 7439-92-1 |
| LEAD SULFATES | 18.2% | 0.05mg/m3 | .05 mg/m3 | NONE | 7439-92-1 |
| LEAD OXIDES | 18.0% | 0.05mg/m3 | .05 mg/m3 | NONE | 7439-92-1 |
| POLYPROPYLENE CASE MTL | 6.4% | | | | |
| SEPARATORS | 3.5% | | | | |
| SULFURIC ACID (H2SO4) | 5.2% | 1.0 mg/m3 | 1.0 mg/m3 | NONE | 7664-93-9 |
| WATER | 19.2% | | | | |

### SECTION III: PHYSICAL / CHEMICAL CHARACTERISTICS

Boiling Point: Approximately 203F
Vapor Pressure: 14 @ 37% @ 80 F
Solubility in Water: 100%
Specific Gravity: 1.245 - 1.295 Battery Electrolyte
Appearance & Odor: Clear Liquid with Sharp Pungent Odor

Vapor Density: Greater than 1
Melting Point: -35 F to +10.6 F
Water Reactive: Yes, Produces Heat

### SECTION IV: FIRE AND EXPLOSION HAZARD DATA:

Flash Point: Not Combustible — NFPA WARNING: 1
Auto Ignition Temperature N/A — Flammability Limits in Air % by Volume: N/A
Extinguishing Media: Dry Chemical Carbon Dioxide, Water Fog, Water
Special Fire Fighting Procedures: Sulfuric Acid Fumes, Sulfur Dioxide Gas or Carbon Monoxide may be released when acid decomposes. Wear NIOSH approved self contained breathing apparatus.

Unusual Hazards: Water applied to sulfuric acid generates heat and causes acid to spatter. Wear full-cover acid resistant clothing. Sulfuric acid reacts violently with metals, nitrates, chlorates, carbides, fulminates, picrates and other organic materials. Reacts with most metals to yield explosive/flammable hydrogen gas. This reaction is intensified when sulfuric acid is diluted with water to form battery electrolyte.

## SECTION V: REACTIVITY DATA

**Stability:** STABLE NFPA WARNING: 0

**CONDITIONS TO AVOID:** Charging and over-charging without proper ventilation.

**Incompatibility:** AVOID COMBUSTIBLES, ORGANIC MATERIALS, AND STRONG REDUCING AGENTS.

**Hazardous Decomposition Products:**

SULFUR TRIOXIDE, CARBON MONOXIDE, SULFURIC ACID FUMES AND SULFUR DIOXIDE. Hydrogen, Arsine, Stibene with over charging.

**Hazardous Polymerization: Should not occur**

## SECTION VI – HEALTH HAZARD DATA

**PRIMARY ROUTES OF ENTRY:** Inhalation - Yes NPFA WARNING: 3
Skin Yes
Ingestion Yes

**HEALTH HAZARDS** - Acute: Eyes, Skin, Respiratory System & Digestive System
Chronic: Eyes, Skin, Respiratory System & Digestive System

**Exposure to Lead Compounds can occur only when product is heated, oxidized or other-wised processed or damaged to create dust vapor or fume. Lead is a systemic poison.**

**Carcinogenicity - NTP: No**
**Carcinogenicity - IARC: Yes (Group 2 B *94-4***
**Carcinogenicity -OSHA: No**

**Signs and Symptoms of Exposure:** Irritation of Exposed Area, Burns, and Respiratory Problems
No possibility of over exposure of lead will occur unless battery is destroyed.

**MEDICAL CONDITIONS GENERALLY:**

Aggravated by Exposure: Exposure to acid mist may cause lung damage & aggravate pulmonary conditions.

## EMERGENCY FIRST AID PROCEDURES

- Seek medical assistance for further treatment, observation and support if necessary.

Eye Contact: Wash with copious quantities of cool water for at least 15 minutes.
Skin Contact: Flush area with large amounts of cool water for at least 15 minutes.
Inhalation: Remove to fresh air, if breathing is difficult – give oxygen.
Ingestion: Give milk to drink. DO NOT INDUCE VOMITING, CALL PHYSICIAN.

## SECTION VII:SPECIAL PRECAUTIONS AND SPILL/LEAK PROCEDURES

STEPS TO TAKE IF MATERIALS RELEASED:

**Wash area with water, neutralize with lime, caustic soda or sodium bicarbonate. If released on soils: work neutralizing materials into top three inches of soils.**

**Neutralizing Agent: Lime, Caustic Soda, or Sodium Bicarbonate.**

**Waste Disposal Method: Neutralize and dispose of residue in accordance with federal, state and local regulation for chemical and toxic metals disposal.**

**Lead and Sulfuric Acid is packed into a container to form the lead-acid battery. Since all containers are subject to leakage and breakage, employees who work in operations where they handle batteries in containers are potentially exposed to hazardous chemicals, and, therefore, need access to information as well as training.**

## SECTION VI II– SPECIAL PROTECTION INFORMATION/CONTROL MEASURES

**Respiratory Protection: Sulfuric Acid Mist-Mask with filter approved for acid mist.**

**Ventilation: Local exhaust: Room air change four times per hour.**

**Protective Gloves: Rubber**

**Eye Protection: Goggles, Face Shield**

**Other Protective Equipment: Rubber Apron, Acid Resistant Clothing Recommended**

**Work Hygienic Practices: Wash thoroughly after handling**

## SECTION IX - PHYSICAL AND CHEMICAL PROPERTIES

**COMPONENTS**

| | |
|---|---|
| METALLIC METAL ALLOY | 25.5% |
| LEAD SULFATES | 18.2% |
| LEAD OXIDES | 18.0% |
| POLYPROPYLENE CASE MTL | 6.4% |
| SEPARATORS | 3.5% |
| SULFURIC ACID (H2SO4) | 5.2% |
| WATER | 19.2% |

## SECTION X – STABILITY AND REACTIVITY

Stability: STABLE

CONDITIONS TO AVOID: Charging and over-charging without proper ventilation.

Incompatibility: AVOID COMBUSTIBLES, ORGANIC MATERIALS, AND STRONG REDUCING AGENTS.

## SECTION XI: TOXICOLOGICAL INFORMATION

HEALTH HAZARDS - Acute: Eyes, Skin, Respiratory System & Digestive System
Chronic: Eyes, Skin, Respiratory System & Digestive System

Signs and Symptoms of Exposure: Irritation of Exposed Area, Burns, and Respiratory Problems
No possibility of over exposure of lead will occur unless battery is destroyed.

MEDICAL CONDITIONS GENERALLY:

Aggravated by Exposure: Exposure to mist may cause lung damage & aggravate pulmonary conditions.

## SECTION XII – ECOLOGICAL INFORMATION

All care should be taken to protect the environment from any adverse impact by lead-acid batteries or from the batteries ingredients.

## SECTION XIII – DISPOSAL CONSIDERATION

Lead-Acid Batteries are restricted land disposal objects. All spent lead-acid batteries should be properly Recycled to a permitted Secondary Lead Smelter.

All battery parts should be properly recycled.

No whole spent lead-acid battery should be land-filled or placed in house hold garbage.

## SECTION XIIII – TRANSPORT INFORMATION

Electric storage batteries containing electrolyte acid or alkaline corrosive battery fluid must be completely protected so that short circuits will be prevented.

DOT SHIPPING NAME: LEAD-ACID BATTERIES, WET, FILLED WITH ACID
DOT CLASS: 8
DOT ID NUMBER: UN2794
DOT PACKING GROUP: III
DOT LABEL REQUIREMENTS: CORROSIVE

## SECTION XV – REGULATION INFORMATION

REGULATORY INFORMATION: Those ingredients in lead-acid batteries listed above are not subject to the reporting requirements of 313 of Title III of the Superfund Amendments and Re-authorization Act, if the lead acid batteries are in storage and have no potential to leak, spill or break during normal storage prior to use.

DOT REGULATIONS: 49 CFR 173.159

EPA REGULATIONS: 40 CFR 266.80

OSHA REGULATIONS: 29 CFR 1910.1200

## 27.2 - MATERIAL SAFETY DATA SHEET - POWERFLOW™ AW HVI HYDRAULIC OIL

# Powerflow™ AW HVI Hydraulic Oil (All Grades)

Material Safety Data Sheet

## 1. Product and Company Identification

| | |
|---|---|
| **Product Name:** | Powerflow™ AW HVI Hydraulic Oil (All Grades) |
| **MSDS Number:** | 814636 |
| **Synonyms:** | Powerflow™ AW HVI Hydraulic Oil 32<br>Powerflow™ AW HVI Hydraulic Oil 46<br>Powerflow™ AW HVI Hydraulic Oil 68 |
| **Intended Use:** | Hydraulic Fluid |
| **Manufacturer/Supplier:** | ConocoPhillips Lubricants<br>600 N. Dairy Ashford, 2W900<br>Houston, Texas 77079-1175 |
| **Emergency Health and Safety Number:** | Chemtrec: 800-424-9300 (24 Hours) |
| **Customer Service:** | U.S.: 800-822-6457 or International: +1-83-2486-3363 |
| **Technical Information:** | 800-766-0050 |
| **MSDS Information:** | Internet: http://w3.conocophillips.com/NetMSDS/ |

## 2. Hazards Identification

**Emergency Overview**

This material is not considered hazardous according to OSHA criteria.

**NFPA**




**Appearance:** Clear and bright
**Physical Form:** Liquid
**Odor:** Petroleum

**Potential Health Effects**
**Eye:** Contact may cause mild eye irritation including stinging, watering, and redness.

**Skin:** Contact may cause mild skin irritation including redness and a burning sensation. Prolonged or repeated contact can defat the skin, causing drying and cracking of the skin, and possibly dermatitis (inflammation). No harmful effects from skin absorption are expected.

**Inhalation (Breathing):** No information available on acute toxicity.

**Ingestion (Swallowing):** Low degree of toxicity by ingestion.

**Signs and Symptoms:** Effects of overexposure may include irritation of the digestive tract, nausea and diarrhea. Inhalation of oil mist or vapors at elevated temperatures may cause respiratory irritation.

**Pre-Existing Medical Conditions:** Conditions which may be aggravated by exposure include skin disorders.

**See Section 11 for additional Toxicity Information.**

## 3. Composition / Information on Ingredients

| Component | CASRN | Concentration* |
|---|---|---|
| Lubricant Base Oil (Petroleum) | VARIOUS | >90 |
| Additives | PROPRIETARY | <10 |

* All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

## 4. First Aid Measures

**Eye Contact:** If irritation or redness develops from exposure, flush eyes with clean water. If symptoms persist, seek medical attention.

**Skin Contact:** Remove contaminated shoes and clothing and cleanse affected area(s) thoroughly by washing with mild soap and water or a waterless hand cleaner. If irritation or redness develops and persists, seek medical attention.

**Inhalation (Breathing):** If respiratory symptoms develop, move victim away from source of exposure and into fresh air in a position comfortable for breathing. If symptoms persist, seek medical attention.

**Ingestion (Swallowing):** First aid is not normally required; however, if swallowed and symptoms develop, seek medical attention.

**Notes to Physician:** High-pressure hydrocarbon injection injuries may produce substantial necrosis of underlying tissue despite an innocuous appearing external wound. These injuries often require extensive emergency surgical debridement and all injuries should be evaluated by a specialist in order to assess the extent of injury. Early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

Acute aspirations of large amounts of oil-laden material may produce a serious aspiration pneumonia. Patients who aspirate these oils should be followed for the development of long-term sequelae. Inhalation exposure to oil mists below current workplace exposure limits is unlikely to cause pulmonary abnormalities.

## 5. Fire-Fighting Measures

NFPA 704 Hazard Class

**Health:** 0 **Flammability:** 1 **Instability:** 0 (0-Minimal, 1-Slight, 2-Moderate, 3-Serious, 4-Severe)

**Unusual Fire & Explosion Hazards:** This material may burn, but will not ignite readily. If container is not properly cooled, it can rupture in the heat of a fire.

**Extinguishing Media:** Dry chemical, carbon dioxide, foam, or water spray is recommended. Water or foam may cause frothing of materials heated above 212°F. Carbon dioxide can displace oxygen. Use caution when applying carbon dioxide in confined spaces.

**Fire Fighting Instructions:** For fires beyond the initial stage, emergency responders in the immediate hazard area should wear protective clothing. When the potential chemical hazard is unknown, in enclosed or confined spaces, a self contained breathing apparatus should be worn. In addition, wear other appropriate protective equipment as conditions warrant (see Section 8).

Isolate immediate hazard area and keep unauthorized personnel out. Stop spill/release if it can be done safely. Move undamaged containers from immediate hazard area if it can be done safely. Water spray may be useful in minimizing or dispersing vapors and to protect personnel. Cool equipment exposed to fire with water, if it can be done safely. Avoid spreading burning liquid with water used for cooling purposes.

**Hazardous Combustion Products:** Combustion may yield smoke, carbon monoxide, and other products of incomplete combustion. Oxides of sulfur, nitrogen or phosphorus may also be formed.

**See Section 9 for Flammable Properties including Flash Point and Flammable (Explosive) Limits**

## 6. Accidental Release Measures

## 6. Accidental Release Measures

**Personal Precautions:** This material may burn, but will not ignite readily. Keep all sources of ignition away from spill/release. The use of explosion-proof electrical equipment is recommended. Stay upwind and away from spill/release. Notify persons down wind of the spill/release, isolate immediate hazard area and keep unauthorized personnel out. Wear appropriate protective equipment, including respiratory protection, as conditions warrant (see Section 8). See Sections 2 and 7 for additional information on hazards and precautionary measures.

**Environmental Precautions:** Stop spill/release if it can be done safely. Prevent spilled material from entering sewers, storm drains, other unauthorized drainage systems, and natural waterways. Use water sparingly to minimize environmental contamination and reduce disposal requirements. Spills into or upon navigable waters, the contiguous zone, or adjoining shorelines that cause a sheen or discoloration on the surface of the water, may require notification of the National Response Center (phone number 800-424-8802).

**Methods for Containment and Clean-Up:** Notify relevant authorities in accordance with all applicable regulations. Immediate cleanup of any spill is recommended. Dike far ahead of spill for later recovery or disposal. Absorb spill with inert material such as sand or vermiculite, and place in suitable container for disposal.

## 7. Handling and Storage

**Precautions for safe handling:** Wash thoroughly after handling. Use good personal hygiene practices and wear appropriate personal protective equipment.

High pressure injection of hydrocarbon fuels, hydraulic oils or greases under the skin may have serious consequences even though no symptoms or injury may be apparent. This can happen accidentally when using high pressure equipment such as high pressure grease guns, fuel injection apparatus or from pinhole leaks in tubing of high pressure hydraulic oil equipment.

Do not enter confined spaces such as tanks or pits without following proper entry procedures such as ASTM D-4276 and 29CFR 1910.146. Do not wear contaminated clothing or shoes.

"Empty" containers retain residue and may be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, or other sources of ignition. They may explode and cause injury or death. "Empty" drums should be completely drained, properly bunged, and promptly shipped to the supplier or a drum reconditioner. All containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations. Before working on or in tanks which contain or have contained this material, refer to OSHA regulations, ANSI Z49.1, and other references pertaining to cleaning, repairing, welding, or other contemplated operations.

**Conditions for safe storage:** Use and store this material in cool, dry, well-ventilated area away from heat and all sources of ignition. Keep container(s) tightly closed. Store only in approved containers. Keep away from any incompatible material (see Section 10). Protect container(s) against physical damage.

## 8. Exposure Controls / Personal Protection

| Component | US-ACGIH | OSHA | Other |
|---|---|---|---|
| Lubricant Base Oil (Petroleum) | TWA: 5mg/m$^3$<br>STEL: 10 mg/m$^3$<br>as Oil Mist, if generated | TWA: 5 mg/m$^3$<br>as Oil Mist, if generated | --- |

**Note: State, local or other agencies or advisory groups may have established more stringent limits. Consult an industrial hygienist or similar professional, or your local agencies, for further information.**

**Engineering controls:** If current ventilation practices are not adequate to maintain airborne concentrations below the established exposure limits, additional engineering controls may be required.

**Eye/Face Protection:** The use of eye protection that meets or exceeds ANSI Z.87.1 is recommended to protect against potential eye contact, irritation, or injury. Depending on conditions of use, a face shield may be necessary.

**Skin/Hand Protection:** The use of gloves impervious to the specific material handled is advised to prevent skin contact. Users should check with manufacturers to confirm the breakthrough performance of their products. Suggested protective materials: Nitrile.

**Respiratory Protection:** Where there is potential for airborne exposure above the exposure limit a NIOSH certified air purifying respirator equipped with R or P95 filters may be used.

A respiratory protection program that meets or is equivalent to OSHA 29 CFR 1910.134 and ANSI Z88.2 should be followed whenever workplace conditions warrant a respirator's use. Air purifying respirators provide limited protection and cannot be used in atmospheres that exceed the maximum use concentration (as directed by regulation or the manufacturer's instructions), in oxygen deficient (less than 19.5 percent oxygen) situations, or under conditions that are immediately dangerous to life and health (IDLH).

**Suggestions provided in this section for exposure control and specific types of protective equipment are based on readily available information. Users should consult with the specific manufacturer to confirm the performance of their protective equipment. Specific situations may require consultation with industrial hygiene, safety, or engineering professionals.**

## 9. Physical and Chemical Properties

**Note:** Unless otherwise stated, values are determined at 20°C (68°F) and 760 mm Hg (1 atm). Data represent typical values and are not intended to be specifications.

| | |
|---|---|
| **Appearance:** | Clear and bright |
| **Physical Form:** | Liquid |
| **Odor:** | Petroleum |
| **Odor Threshold:** | No data |
| **pH:** | Not applicable |
| **Vapor Pressure:** | <1 mm Hg |
| **Vapor Density (air=1):** | >1 |
| **Boiling Point/Range:** | No data |
| **Melting/Freezing Point:** | <-29.2°F / <-34°C |
| **Pour Point:** | <-29.2°F / <-34°C |
| **Solubility in Water:** | Insoluble |
| **Partition Coefficient (n-octanol/water) (Kow):** | No data |
| **Specific Gravity:** | 0.87 @ 60°F (15.6°C) |
| **Bulk Density:** | 7.3 lbs/gal |
| **Viscosity:** | 7 - 12 cSt @ 100°C; 32 - 68 cSt @ 40°C |
| **Evaporation Rate (nBuAc=1):** | No data |
| **Flash Point:** | >320°F / >160°C |
| **Test Method:** | Pensky-Martens Closed Cup (PMCC), ASTM D93, EPA 1010 |
| **LEL (vol % in air):** | No data |
| **UEL (vol % in air):** | No data |
| **Autoignition Temperature:** | No data |

## 10. Stability and Reactivity

**Stability:** Stable under normal ambient and anticipated conditions of use.

**Conditions to Avoid:** Extended exposure to high temperatures can cause decomposition.

**Materials to Avoid (Incompatible Materials):** Avoid contact with strong oxidizing agents and strong reducing agents.

**Hazardous Decomposition Products:** Not anticipated under normal conditions of use.

**Hazardous Polymerization:** Not known to occur.

## 11. Toxicological Information

Chronic Data:

**Lubricant Base Oil (Petroleum)**

*Carcinogenicity:* The petroleum base oils contained in this product have been highly refined by a variety of processes including severe hydrocracking/hydroprocessing to reduce aromatics and improve performance characteristics. All of the oils meet the IP-346 criteria of less than 3 percent PAH's and are not considered carcinogens by NTP, IARC, or OSHA.

Acute Data:

| Component | Oral LD50 | Dermal LD50 | Inhalation LC50 |
|---|---|---|---|
| Lubricant Base Oil (Petroleum) | >5 g/kg | >2 g/kg | No data |

## 12. Ecological Information

**Ecotoxicity:** Experimental studies show that acute aquatic toxicity values are greater than 1000 mg/l. These values are consistent with the predicted aquatic toxicity of these substances based on their hydrocarbon compositions.

**Mobility:** Volatilization to air is not expected to be a significant fate process due to the low vapor pressure of this material. In water, base oils will float and spread over the surface at a rate dependent upon viscosity. There will be significant removal of hydrocarbons from the water by sediment adsorption. In soil and sediment, hydrocarbon components will show low mobility with adsorption to sediments being the predominant physical process. The main fate process is expected to be slow biodegradation of base oil components in soil and sediment.

**Persistence and degradability:** The hydrocarbons in this material are not readily biodegradable, but since they can be degraded by microorganisms, they are regarded as inherently biodegradable.

**Bioaccumulation Potential:** Log Kow values measured for the hydrocarbon components of this material range from 4 to over 6, and therefore regarded as having the potential to bioaccumulate. In practice, metabolic processes may reduce bioconcentration.

## 13. Disposal Considerations

The generator of a waste is always responsible for making proper hazardous waste determinations and needs to consider state and local requirements in addition to federal regulations.

This material, if discarded as produced, would not be a federally regulated RCRA "listed" hazardous waste and is not believed to exhibit characteristics of hazardous waste. See Sections 7 and 8 for information on handling, storage and personal protection and Section 9 for physical/chemical properties. It is possible that the material as produced contains constituents which are not required to be listed in the MSDS but could affect the hazardous waste determination. Additionally, use which results in chemical or physical change of this material could subject it to regulation as a hazardous waste.

This material under most intended uses would become "Used Oil" due to contamination by physical or chemical impurities. Whenever possible, Recycle Used Oil in accordance with applicable federal and state or local regulations. Container contents should be completely used and containers should be emptied prior to discard.

## 14. Transportation Information

U.S. Department of Transportation (DOT)
Shipping Description: *Not regulated*
Note: *If shipped by land in a packaging having a capacity of 3,500 gallons or more, the provisions of 49 CFR, Part 130 apply. (Contains oil)*

International Maritime Dangerous Goods (IMDG)
Shipping Description: *Not regulated*
Note: *U.S. DOT compliance requirements may apply. See 49 CFR 171.22, 23 & 25.*

International Civil Aviation Org. / International Air Transport Assoc. (ICAO/IATA)
UN/ID #: *Not regulated*

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## 14. Transportation Information

| | LTD. QTY | Passenger Aircraft | Cargo Aircraft Only |
|---|---|---|---|
| Packaging Instruction #: | --- | --- | --- |
| Max. Net Qty. Per Package: | --- | --- | --- |

## 15. Regulatory Information

**CERCLA/SARA - Section 302 Extremely Hazardous Substances and TPQs (in pounds):**
This material does not contain any chemicals subject to the reporting requirements of SARA 302 and 40 CFR 372.

**CERCLA/SARA - Section 311/312 (Title III Hazard Categories)**

| | |
|---|---|
| **Acute Health:** | No |
| **Chronic Health:** | No |
| **Fire Hazard:** | No |
| **Pressure Hazard:** | No |
| **Reactive Hazard:** | No |

**CERCLA/SARA - Section 313 and 40 CFR 372:**
This material contains the following chemicals subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR 372:

| Component | Concentration* | de minimis |
|---|---|---|
| Zinc Compound(s) | 1 | 1.0% |

**EPA (CERCLA) Reportable Quantity (in pounds):**
This material does not contain any chemicals with CERCLA Reportable Quantities.

**California Proposition 65:**
This material does not contain any chemicals which are known to the State of California to cause cancer, birth defects or other reproductive harm at concentrations that trigger the warning requirements of California Proposition 65.

**Canadian Regulations:**
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the Regulations.

WHMIS Hazard Class
None

**National Chemical Inventories:**
All components are either listed on the US TSCA Inventory, or are not regulated under TSCA.
All components are either on the DSL, or are exempt from DSL listing requirements.

**U.S. Export Control Classification Number:** EAR99

## 16. Other Information

| | |
|---|---|
| **Date of Issue:** | 14-Nov-2008 |
| **Status:** | Final |
| **Revised Sections or Basis for Revision:** | New MSDS |
| **MSDS Number:** | 814636 |

**Guide to Abbreviations:**
ACGIH = American Conference of Governmental Industrial Hygienists; CASRN = Chemical Abstracts Service Registry Number; CEILING = Ceiling Limit (15 minutes); CERCLA = The Comprehensive Environmental Response, Compensation, and Liability Act; EPA = Environmental Protection Agency; IARC = International Agency for Research on Cancer; LEL = Lower Explosive Limit; NE = Not Established; NFPA = National Fire Protection Association; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration; PEL = Permissible Exposure Limit (OSHA); SARA = Superfund Amendments and Reauthorization Act; STEL = Short Term Exposure Limit (15 minutes); TLV = Threshold Limit Value (ACGIH); TWA = Time Weighted Average (8 hours); UEL = Upper Explosive Limit; WHMIS = Worker Hazardous Materials Information System (Canada)

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**Status:** Final

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**Disclaimer of Expressed and implied Warranties:**
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# Notes

# E-Trouble shooting and diagram

## 1 - Troubleshooting

Refer to the following table for basic troubleshooting operations. Contact HAULOTTE® Customer Service Department at 1-800-537-0540 or visit HAULOTTE® online at www.haulotte-usa.com with any questions or before attempting any advanced troubleshooting operations.

**Troubleshooting**

| Problem | Cause | Solution |
|---|---|---|
| No lights on panel when key switch is turned to the ON position. | 1.Emergency STOP engaged.<br>2.Battery charge is low.<br>3.Battery ground or in-series cable is loose.<br>4.Battery main disconnect unplugged.<br>5.Blown fuse. | 6.Disengage Emergency Stop buttons.<br>7.Recharge as needed.<br>8.Inspect and repair battery connections.<br>9.Plug in main disconnect.<br>10.Replace fuse as necessary. |
| Error code displayed on Ground Control box. | 11.Error detected by Control Box. | 12.Refer to Error Code Definitions. |
| Green light flashing on Motor Controller. | 13.Error detected by Motor Controller. | 14.Refer to Motor Controller Error Code Definitions. |
| Hydraulic function does not work and display window shows an error message. | 15.Error detected by safety interlock microprocessor.<br>16.Aerial work platform electric or electronic failure. | 17.Refer to Error Code Definitions.<br>18.Refer to Error Code Definitions. |
| Outrigger indicator LED lights do not function. | 19.Key switch turned to the OFF or platform controls position.<br>20.Emergency STOP engaged.<br>21.Outriggers not deployed. | 22.Turn key switch to ground controls position.<br>23.Disengage Emergency Stop buttons.<br>24.Deploy all outriggers. |
| One or more telescoping boom controls do not function.<br>Or<br>One or more telescoping boom controls function improperly.<br>Or<br>One or more telescoping boom controls function intermittently. | 25.Key switch is turned to the OFF or incorrect control position.<br>26.Battery charge is low.<br>27.Emergency STOP engaged.<br>28.Battery ground or in-series cable is loose.<br>29.All outriggers not properly deployed.<br>30.Hydraulic pump inoperative.<br>31.Loose wiring connector.<br>32.Valve solenoid not operating properly.<br>33.Error detected by safety interlock.<br>34.Broken or loose wire. | 35.Turn key switch to ground or platform controls position.<br>36.Recharge battery.<br>37.Disengage Emergency Stop buttons.<br>38.Inspect and repair battery connections.<br>39.Deploy all outriggers and level aerial work platform.<br>40.Inspect pump; replace and repair as needed.<br>41.Check wiring terminals in control box and at valve manifold. Replace or repair as needed.<br>42.Clean valve solenoid and recheck function(s). Replace or repair as needed.<br>43.Check display for system status. See Table for Error Code Definitions and corrections.<br>44.Inspect wiring in control box and at valve manifold and valve coil. Replace or repair as needed. |

## 1.1 - Error code definitions - controls

The DISPLAY PANEL located on the ground (lower) control box indicates the present operating status of the aerial work platform. If an error condition is detected, the appropriate error code will be displayed on this panel.

Refer to this table to resolve the error or contact HAULOTTE® Customer Service Department at 1-800-537-0540 or visit HAULOTTE® online at www.haulotte-usa.com with any additional questions.

**Error code definitions**

| Error code | Error message | Error definition | To simulate error | To clear error | Comments |
|---|---|---|---|---|---|
| 001 | MACHINE IS IN DOWN ONLY MODE | Machine went out of level with use, moment sense or load sense circuits have detected an overload. | Level machine, raise boom and tilt level sensor. | This is a self clearing error. When error condition is corrected, error is cleared. | Error will be displayed only if boom is raised. |
| 002 | LOSS OF PLATFORM COMMUNICATION | Lower Control has lost RS485 communication with Platform Control. | Open platform control box and remove green wire from J1. | This is a latched error. Power must be cycled to clear error. | The platform control box "Engine ON" LED will also blink a 2 blink error code. |
| 003 | LOSS OF DRIVE COMMUNICATION | Lower Control has lost RS485 communication with Drive Control. | Open Drive Control and remove green wire from J1. | This is a latched error. Power must be cycled to clear error. | Machines with Drive option only. The Drive Control "Engine On" LED will also blink a 2 blink error code. |
| 004 | LOSS OF PC COMMUNICATION | Lower Control has lost RS232 communication with PC. | Connect a PC without running the configuration program. | This is a self clearing error. When error condition is corrected, error is cleared. | Error message will only be display if connected to a PC that is not communicating. |
| 005 | PLATFORM CONTROL HAS STUCK KEY | Platform control box has detected a stuck or pressed key on power up. | On platform control box hold down a key at power up. | This is a latched error. Power must be cycled to clear error. | The platform control box "Engine ON" LED will also blink a 1 blink error code. |
| 006 | DRIVE CONTROL HAS STUCK KEY | Drive Control has detected a stuck or pressed key on power up. | On Drive Control hold down a key at power up. | This is a latched error. Power must be cycled to clear error. | Machines with Drive option only. The Drive Control "Engine On" LED will also blink a 1 blink error code. |
| 007 | DRIVE CONTROL HAS STUCK JOYSTICK | Drive Control has detected a stuck or pressed joystick on power up. | On Drive Control hold joystick to side at power up. | This is a latched error. Power must be cycled to clear error. | Machines with Drive option only. The Drive Control "Engine On" LED will also blink a 3 blink error code. |
| 008 | GROUND CONTROL HAS STUCK KEY | Lower Control has detected a stuck or pressed key on power up. | On Lower Control box hold down a key at power up. | This is a latched error. Power must be cycled to clear error. | The Lower Control box "Power" LED will also blink a 1 blink error code. |
| 009 | BOOM UP WITHOUT OUTRIGGERS ON GROUND | Lower Control box has detected the boom is up and all four outriggers are not on the ground. | Disconnect a wire from either the boom down or any outrigger switch and turn on machine. | This is a self clearing error. When error condition is corrected, error is cleared. | - |

# E-Trouble shooting and diagram

| Error code | Error message | Error definition | To simulate error | To clear error | Comments |
|---|---|---|---|---|---|
| 010 | LEVEL SENSOR HAS ERRATIC OUTPUT | The Lower Control box has detected an erratic output from the level sensor. | Shaking the level sensor after machine has been leveled. | This is a self clearing error. When error condition is corrected, error is cleared. | This error is suppressed during extending and retracting outriggers. |
| 011 | TRYING TO DRIVE W/ TRAILER BRAKE OFF | An attempt was made to drive machine without engaging the trailer brake. | Trying to drive machine with trailer brake off. | This is a self clearing error. When error condition is corrected, error is cleared. | Machines with Drive and Set option only |
| 012 | ANGLE SENSOR IS DISCONNECTED OR BAD | Angle sensor output is out of range. | Disconnect Angle Sensor | This is a self clearing error. When error condition is corrected, error is cleared. | Machines with Moment Sense option only. |
| 013 | PRESSURE SENSOR IS DISCONNECTED OR BAD | Pressure sensor output is out of range. | Disconnect Pressure Sensor. | This is a self clearing error. When error condition is corrected, error is cleared. | Machines with Moment Sense option only |
| 014 | CHECK ENGINE LOW OIL PRESSURE | Engine had low oil pressure while running. | Kawasaki Engine : While engine is running, disconnect engine oil pressure sense wire. Kubota Engine : While engine is running, disconnect engine oil pressure sense wire and connect wire to ground. | This is a latched error. Power must be cycled to clear error. | X-Boom Machines with Kawasaki or Kubota engines |
| 015 | MACHINE IS NOT LEVEL | Machine has gone out of level with use. | Tilt level sensor | This is a self clearing error. When error condition is corrected, error is cleared. | - |
| 016 | LIFT BOOM | A Boom Rotate, Extend or Retract function has been requested while boom is down. | Try to Rotate, Extend or Retract the boom while boom is down. | This is a self clearing error. When error condition is corrected, error is cleared. | - |
| 017 | STOW BOOM | An Outrigger function has been requested while boom is up. | Try to move an outrigger while boom is up. | This is a self clearing error. When error condition is corrected, error is cleared. | - |
| 018 | LOSS OF LOAD SENSE COMMUNICATION | Lower Control has lost RS485 communication with Load Sense Module. | Remove Load Sense Module from machine. | This is a latched error. Power must be cycled to clear error. | Machines with Load Sense option only |

# E-Trouble shooting and diagram

| Error code | Error message | Error definition | To simulate error | To clear error | Comments |
|---|---|---|---|---|---|
| 019 | BOOM FUNCTION DISABLED | Load Sense Module has detected an overloaded boom and disabled boom functions. | Overload Boom | This is a latched error. Power must be cycled to clear error. | Machines with Load Sense option only |
| 020 | LOSS OF LOAD CELL CONNECTION | Load Sense Module has lost connection with Load Cell. | Disconnect Load Cell from Load Sense Module. | This is a self clearing error. When error condition is corrected, error is cleared. | Machines with Load Sense option only |
| 021 | OPEN CIRCUIT PRIMARY UP | A load of less than 70mA was detected when Primary Up circuit was energized. | Disconnect a wire from Primary Up coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up |
| 022 | SHORTED CIRCUIT PRIMARY UP | Excessive load was detected when Primary Up circuit was energized. | Use a piece of wire to short the Primary Up coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up |
| 023 | OPEN CIRCUIT PRIMARY DOWN | A load of less than 70mA was detected when Primary Down circuit was energized. | Disconnect a wire from Primary Down coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Articulating Boom Models |
| 024 | SHORTED CIRCUIT PRIMARY DOWN | Excessive load detected when primary down circuit was energized. | Use a piece of wire to short the Primary Down coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Articulating Boom Models |
| 025 | OPEN CIRCUIT SECONDARY UP | A load of less than 70mA was detected when Secondary Up circuit was energized. | Disconnect a wire from Secondary Up coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Articulating Boom Models |
| 026 | SHORTED CIRCUIT SECONDARY UP | Excessive load was detected when Secondary Up circuit was energized. | Use a piece of wire to short the Secondary Up coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Articulating Boom Models |
| 027 | OPEN CIRCUIT SECONDARY DOWN | A load of less than 70mA detected when secondary down circuit was energized. | Disconnect a wire from Secondary Down coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Articulating Boom Models |
| 028 | SHORTED CIRCUIT SECONDARY DOWN | Excessive load was detected when Secondary Down circuit was energized. | Use a piece of wire to short the Secondary Down coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Articulating Boom Models |
| 029 | OPEN CIRCUIT JIB UP | A load of less than 70mA was detected when Jib Up circuit was energized. | Disconnect a wire from Jib Up coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Articulating Boom Models |
| 030 | SHORTED CIRCUIT JIB UP | Excessive load was detected when Jib Up circuit was energized. | Use a piece of wire to short the Jib Up coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Articulating Boom Models |

# E-Trouble shooting and diagram

| Error code | Error message | Error definition | To simulate error | To clear error | Comments |
|---|---|---|---|---|---|
| 031 | OPEN CIRCUIT JIB DOWN | A load of less than 70mA was detected when Jib Down circuit was energized. | Disconnect a wire from Jib Down coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Articulating Boom Models |
| 032 | SHORTED CIRCUIT JIB DOWN | Excessive load was detected when Jib Down circuit was energized. | Use a piece of wire to short the Jib Down coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Articulating Boom Models |
| 033 | OPEN CIRCUIT EXTEND | A load of less than 70mA was detected when Extend circuit was energized. | Disconnect a wire from Extend coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up |
| 034 | SHORTED CIRCUIT EXTEND | Excessive load was detected when Extend circuit was energized. | Use a piece of wire to short the Extend coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up |
| 035 | OPEN CIRCUIT RETRACT | A load of less than 70mA was detected when Retract circuit was energized. | Disconnect a wire from Retract coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up |
| 036 | SHORTED CIRCUIT RETRACT | Excessive load was detected when Retract circuit was energized. | Use a piece of wire to short the Retract coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up |
| 037 | OPEN CIRCUIT PLATFORM LEVEL UP | A load of less than 70mA was detected when Platform Level Up circuit was energized. | Disconnect a wire from Platform Level Up coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up |
| 038 | SHORTED CIRCUIT PLATFORM LEVEL UP | Excessive load was detected when Platform Level Up circuit was energized. | Use a piece of wire to short the Platform Level Up coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up |
| 039 | OPEN CIRCUIT PLATFORM LEVEL DOWN | A load of less than 70mA was detected when Platform Level Down circuit was energized. | Disconnect a wire from Platform Level Down coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up |
| 040 | SHORTED CIRCUIT PLATFORM LEVEL DOWN | Excessive load was detected when Platform Level Down circuit was energized. | Use a piece of wire to short the Platform Level Down coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up |
| 041 | OPEN CIRCUIT PLATFORM CW | A load of less than 70mA was detected when Platform CW circuit was energized. | Disconnect a wire from Platform CW coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Articulating Boom Models |
| 042 | SHORTED CIRCUIT PLATFORM CW | Excessive load was detected when Platform CW circuit was energized. | Use a piece of wire to short the Platform CW coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Articulating Boom Models |
| 043 | OPEN CIRCUIT PLATFORM CCW | A load of less than 70mA was detected when Platform CCW circuit was energized. | Disconnect a wire from Platform CCW coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Articulating Boom Models |

# E-Trouble shooting and diagram

| Error code | Error message | Error definition | To simulate error | To clear error | Comments |
|---|---|---|---|---|---|
| 044 | SHORTED CIRCUIT PLATFORM CCW | Excessive load was detected when Platform CCW circuit was energized. | Use a piece of wire to short the Platform CCW coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Articulating Boom Models |
| 045 | OPEN CIRCUIT TURNTABLE CW | A load of less than 70mA was detected when Turntable CW circuit was energized. | Disconnect a wire from Turntable CW coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up |
| 046 | SHORTED CIRCUIT TURNTABLE CW | Excessive load was detected when Turntable CW circuit was energized. | Use a piece of wire to short the Turntable CW coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up |
| 047 | OPEN CIRCUIT TURNTABLE CCW | A load of less than 70mA was detected when Turntable CCW circuit was energized. | Disconnect a wire from Turntable CCW coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up |
| 048 | SHORTED CIRCUIT TURNTABLE CCW | Excessive load was detected when Turntable CCW circuit was energized. | Use a piece of wire to short the Turntable CCW coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up |
| 049 | OPEN CIRCUIT OUTRIGGER RETRACT | A load of less than 70mA was detected when Outrigger Retract circuit was energized. | Disconnect a wire from Outrigger Retract coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up |
| 050 | SHORTED CIRCUIT OUTRIGGER RETRACT | Excessive load was detected when Outrigger Retract circuit was energized. | Use a piece of wire to short the Outrigger Retract coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up |
| 051 | OPEN CIRCUIT OUTRIGGER EXTEND | A load of less than 70mA was detected when Outrigger Extend circuit was energized. | Disconnect a wire from Outrigger Extend coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up |
| 052 | SHORTED CIRCUIT OUTRIGGER EXTEND | Excessive load was detected when Outrigger Extend circuit was energized. | Use a piece of wire to short the Outrigger Extend coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up |
| 053 | OPEN CIRCUIT LF OUTRIGGER | A load of less than 70mA was detected when LF Outrigger circuit was energized. | Disconnect a wire from LF Outrigger coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up |
| 054 | SHORTED CIRCUIT LF OUTRIGGER | Excessive load was detected when LF Outrigger circuit was energized. | Use a piece of wire to short the LF Outrigger coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up |
| 055 | OPEN CIRCUIT RF OUTRIGGER | A load of less than 70mA was detected when RF Outrigger circuit was energized. | Disconnect a wire from RF Outrigger coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up |

| Error code | Error message | Error definition | To simulate error | To clear error | Comments |
|---|---|---|---|---|---|
| 056 | SHORTED CIRCUIT RF OUTRIGGER | Excessive load was detected when RF Outrigger circuit was energized. | Use a piece of wire to short the RF Outrigger coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up |
| 057 | OPEN CIRCUIT LR OUTRIGGER | A load of less than 70mA was detected when LR Outrigger circuit was energized. | Disconnect a wire from LR Outrigger coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up |
| 058 | SHORTED CIRCUIT LR OUTRIGGER | Excessive load was detected when LR Outrigger circuit was energized. | Use a piece of wire to short the LR Outrigger coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up |
| 059 | OPEN CIRCUIT RR OUTRIGGER | A load of less than 70mA was detected when RR Outrigger circuit was energized. | Disconnect a wire from RR Outrigger coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up |
| 060 | SHORTED CIRCUIT RR OUTRIGGER | Excessive load was detected when RR Outrigger circuit was energized. | Use a piece of wire to short the RR Outrigger coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up |
| 061 | OPEN CIRCUIT ENGINE THROTTLE | A load of less than 70mA was detected when Engine Throttle circuit was energized. | Disconnect a wire from Engine Throttle coil. | This is a latched error. Power must be cycled to clear error. | Error Suppressed due to low current draw |
| 062 | SHORTED CIRCUIT ENGINE THROTTLE | Excessive load was detected when Engine Throttle circuit was energized. | Use a piece of wire to short the Engine Throttle coil. | This is a latched error. Power must be cycled to clear error. | Error Suppressed due to low current draw |
| 063 | OPEN CIRCUIT ENGINE STARTER | A load of less than 70mA was detected when Engine Starter circuit was energized. | Disconnect a wire from Engine Starter coil. | This is a latched error. Power must be cycled to clear error. | Not tested. Do not want to crank engine on power up. |
| 064 | SHORTED CIRCUIT ENGINE STARTER | Excessive load was detected when Engine Starter circuit was energized. | Use a piece of wire to short the Engine Starter coil. | This is a latched error. Power must be cycled to clear error. | Not tested. Do not want to crank engine on power up. |
| 065 | OPEN CIRCUIT ENGINE CHOKE | A load of less than 70mA was detected when Engine Choke circuit was energized. | Disconnect a wire from Engine Choke coil. | This is a latched error. Power must be cycled to clear error. | Error Suppressed due to low current draw |
| 066 | SHORTED CIRCUIT ENGINE CHOKE | Excessive load was detected when Engine Choke circuit was energized. | Use a piece of wire to short the Engine Choke coil. | This is a latched error. Power must be cycled to clear error. | Error Suppressed due to low current draw |
| 067 | OPEN CIRCUIT ENGINE STOP | A load of less than 70mA was detected when Engine Stop circuit was energized. | Disconnect a wire from Engine Stop coil. | This is a latched error. Power must be cycled to clear error. | Error Suppressed due to low current draw |

# E-Trouble shooting and diagram

| Error code | Error message | Error definition | To simulate error | To clear error | Comments |
|---|---|---|---|---|---|
| 068 | SHORTED CIRCUIT ENGINE STOP | Excessive load was detected when Engine Stop circuit was energized. | Use a piece of wire to short the Engine Stop coil. | This is a latched error. Power must be cycled to clear error. | Error Suppressed due to low current draw |
| 069 | OPEN CIRCUIT PROPORTIONAL | A load of less than 70mA was detected when Proportional circuit was energized. | Disconnect a wire from Proportional coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up |
| 070 | SHORTED CIRCUIT PROPORTIONAL | Excessive load was detected when Proportional circuit was energized. | Use a piece of wire to short the Proportional coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up |
| 071 | OPEN CIRCUIT MOTOR CONTROL ENABLE | A load of less than 70mA was detected when Motor Control Enable circuit was energized. | Disconnect a wire from Motor Control Enable coil. | - | Error Suppressed due to low current draw |
| 072 | SHORTED CIRCUIT MOTOR CONTROL ENABLE | Excessive load was detected when Motor Control Enable circuit was energized. | Use a piece of wire to short the Motor Control Enable coil. | - | Error Suppressed due to low current draw |
| 073 | OPEN CIRCUIT SPARE OUTPUT | A load of less than 70mA was detected when Spare Output circuit was energized. | Disconnect a wire from Spare Output coil. | This is a latched error. Power must be cycled to clear error. | Not used |
| 074 | SHORTED CIRCUIT SPARE OUTPUT | Excessive load was detected when Spare Output circuit was energized. | Use a piece of wire to short the Spare Output coil. | This is a latched error. Power must be cycled to clear error. | Not used |
| 075 | OPEN CIRCUIT AC SWITCH | A load of less than 70mA was detected when AC Switch circuit was energized. | Disconnect a wire from AC Switch coil. | - | Error Suppressed due to low current draw |
| 076 | SHORTED CIRCUIT AC SWITCH | Excessive load was detected when AC Switch circuit was energized. | Use a piece of wire to short the AC Switch coil. | - | Error Suppressed due to low current draw |
| 077 | OPEN CIRCUIT STROBE | A load of less than 70mA was detected when Strobe circuit was energized. | Disconnect a wire from Strobe. | - | Error Suppressed due to low current draw |
| 078 | SHORTED CIRCUIT STROBE | Excessive load was detected when Strobe circuit was energized. | Use a piece of wire to short the Strobe coil. | - | Error Suppressed due to low current draw |
| 079 | OPEN CIRCUIT DRIVE PWM | A load of less than 70mA was detected when Drive PWM circuit was energized. | Disconnect a wire from Drive PWM coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with Drive option only |
| 080 | SHORTED CIRCUIT DRIVE PWM | Excessive load was detected when Drive PWM circuit was energized. | Use a piece of wire to short the Drive PWM coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with Drive option only |

# E-Trouble shooting and diagram

| Error code | Error message | Error definition | To simulate error | To clear error | Comments |
|---|---|---|---|---|---|
| 081 | OPEN CIRCUIT DRIVE ENABLE | A load of less than 70mA was detected when Drive Enable circuit was energized. | Disconnect a wire from Drive Enable coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with Drive option only |
| 082 | SHORTED CIRCUIT DRIVE ENABLE | Excessive load was detected when Drive Enable circuit was energized. | Use a piece of wire to short the Drive Enable coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with Drive option only |
| 083 | OPEN CIRCUIT DRIVE DUMP (C21) | A load of less than 70mA was detected when Drive Dump ( C21) circuit was energized. | Disconnect a wire from Drive Dump ( C21) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WD option only |
| 084 | SHORTED CIRCUIT DRIVE DUMP (C21) | Excessive load was detected when Drive Dump ( C21) circuit was energized. | Use a piece of wire to short the Drive Engage coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WD option only |
| 085 | OPEN CIRCUIT TURN LEFT (C22) | A load of less than 70mA was detected when Turn Left ( C22) circuit was energized. | Disconnect a wire from Turn Left ( C22) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WD option only |
| 086 | SHORTED CIRCUIT TURN LEFT (C22) | Excessive load was detected when Turn Left ( C22) circuit was energized. | Use a piece of wire to short the Turn Left ( C22) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WD option only |
| 087 | OPEN CIRCUIT TURN RIGHT (C23) | A load of less than 70mA was detected when Turn Right ( C23) circuit was energized. | Disconnect a wire from Turn Right ( C23) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WD option only |
| 088 | SHORTED CIRCUIT TURN RIGHT (C23) | Excessive load was detected when Turn Right ( C23) circuit was energized. | Use a piece of wire to short the Turn Right ( C23) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WD option only |
| 089 | OPEN CIRCUIT FORWARD 1 (C24) | A load of less than 70mA was detected when Forward 1 ( C24) circuit was energized. | Disconnect a wire from Forward 1 ( C24) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WD option only |
| 090 | SHORTED CIRCUIT FORWARD 1 (C24) | Excessive load was detected when Forward 1 ( C24) circuit was energized. | Use a piece of wire to short the Forward 1 ( C24) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WD option only |
| 091 | OPEN CIRCUIT REVERSE 1 (C25) | A load of less than 70mA was detected when Reverse 1 ( C25) circuit was energized. | Disconnect a wire from Reverse 1 ( C25) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WD option only |
| 092 | SHORTED CIRCUIT REVERSE 1 (C25) | Excessive load was detected when Reverse 1 ( C25) circuit was energized. | Use a piece of wire to short the Reverse 1 ( C25) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WD option only |

# E-Trouble shooting and diagram

| Error code | Error message | Error definition | To simulate error | To clear error | Comments |
|---|---|---|---|---|---|
| 093 | OPEN CIRCUIT FORWARD 2 (C27) | A load of less than 70mA was detected when Forward 2 ( C27) circuit was energized. | Disconnect a wire from Forward 2 ( C27) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WD option only |
| 094 | SHORTED CIRCUIT FORWARD 2 (C27) | Excessive load was detected when Forward 2 ( C27) circuit was energized. | Use a piece of wire to short the Forward 2 ( C27) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WD option only |
| 095 | OPEN CIRCUIT REVERSE 2 (C28) | A load of less than 70mA was detected when Reverse 2 ( C28) circuit was energized. | Disconnect a wire from Reverse 2 ( C28) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WD option only |
| 096 | SHORTED CIRCUIT REVERSE 2 (C28) | Excessive load was detected when Reverse 2 ( C28) circuit was energized. | Use a piece of wire to short the Reverse 2 ( C28) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WD option only |
| 097 | OPEN CIRCUIT TORQUE H/L (C29) | A load of less than 70mA was detected when Torque H/L ( C29) circuit was energized. | Disconnect a wire from Torque H/L ( C29) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WD option only |
| 098 | SHORTED CIRCUIT TORQUE H/L (C29) | Excessive load was detected when Torque H/L ( C29) circuit was energized. | Use a piece of wire to short the Torque H/L ( C29) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WD option only |
| 099 | OPEN CIRCUIT TORQUE H/L (C30) | A load of less than 70mA was detected when Torque H/L ( C30) circuit was energized. | Disconnect a wire from Torque H/L ( C30) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WD option only |
| 100 | SHORTED CIRCUIT TORQUE H/L (C30) | Excessive load was detected when Torque H/L ( C30) circuit was energized. | Use a piece of wire to short the Torque H/L ( C30) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WD option only |
| 101 | OPEN CIRCUIT TORQUE H/L (C31) | A load of less than 70mA was detected when Torque H/L ( C31) circuit was energized. | Disconnect a wire from Torque H/L ( C31) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WD option only |
| 102 | SHORTED CIRCUIT TORQUE H/L (C31) | Excessive load was detected when Torque H/L ( C31) circuit was energized. | Use a piece of wire to short the Torque H/L ( C31) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WD option only |
| 103 | OUTREACH NEAR MAXIMUM | Boom has exceeded 95% of maximum outreach. | Put 226,8 Kg (500 lbs) in boom, level boom and extend until alarm sounds and error is displayed. | This is a self clearing error. When error condition is corrected, error is cleared. | Machines with Moment Sense option only |

# E-Trouble shooting and diagram

| Error code | Error message | Error definition | To simulate error | To clear error | Comments |
|---|---|---|---|---|---|
| 104 | OUTREACH AT MAXIMUM | Boom has reached maximum outreach setting. | Put 226,8 Kg (500 lbs) in boom, level boom and extend until alarm sounds and error is displayed. | This is a self clearing error. When error condition is corrected, error is cleared. | Machines with Moment Sense option only |
| 105 | OVER MAXIMUM CYLINDER PRESSURE | Cylinder pressure has exceeded maximum pressure setting. | Put 226,8 Kg (500 lbs) in boom, lower cylinder pressure setting using configuration program and extend boom until alarm sounds and error is displayed. | This is a latched error. Power must be cycled to clear error. | Machines with Moment Sense option only |
| 106 | OUTREACH SENSING FAULT | Cylinder safety pressure switch has detected maximum pressure setting. | Disconnect safety pressure switch wires. | This is a latched error. Power must be cycled to clear error. | Machines with Moment Sense option only |
| 107 | ENGINE TEMP HIGH CHECK WATER LEVEL | Excessive engine temperature was detected. | Remove wire from engine temperature sensor and connect wire to ground. | This is a self clearing error. When error condition is corrected, error is cleared. | Machines with 4WS option only |
| 108 | CHECK ALTERNATOR NOT CHARGING | Engine alternator is not charging. | Remove P wire from alternator and connect wire to ground. | This is a self clearing error. When error condition is corrected, error is cleared. | Machines with 4WS option only |
| 109 | ENGINE RPM FAULT HIGH RPM IS TOO LOW | When driving, engine high RPM was too low. | Misadjust engine high RPM to a value less than 3000 RPM and attempt to drive. | This is a latched error. Power or engine must be cycled to clear error. | Machines with 4WS option only |
| 121 | OPEN CIRCUIT BRAKE (FWS C21) | A load of less than 70mA was detected when Brake (FWS C21) circuit was energized. | Disconnect a wire from Brake (FWS C21) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WS option only |
| 122 | SHORTED CIRCUIT BRAKE (FWS C21) | Excessive load was detected when Brake (FWS C21) circuit was energized. | Use a piece of wire to short the Brake (FWS C21) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WS option only |
| 123 | OPEN CIRCUIT RS RET (FWS C22) | A load of less than 70mA was detected when RS Ret (FWS C22) circuit was energized. | Disconnect a wire from RS Ret (FWS C22) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WS option only |
| 124 | SHORTED CIRCUIT RS RET (FWS C22) | Excessive load was detected when RS Ret (FWS C22) circuit was energized. | Use a piece of wire to short the RS Ret (FWS C22) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WS option only |

| Error code | Error message | Error definition | To simulate error | To clear error | Comments |
|---|---|---|---|---|---|
| 125 | OPEN CIRCUIT RS EXT (FWS C23) | A load of less than 70mA was detected when RS Ext (FWS C23) circuit was energized. | Disconnect a wire from RS Ext (FWS C23) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WS option only |
| 126 | SHORTED CIRCUIT RS RET (FWS C23) | Excessive load was detected when RS Ext (FWS C23) circuit was energized. | Use a piece of wire to short the RS Ext (FWS C23) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WS option only |
| 127 | OPEN CIRCUIT FS RET (FWS C24) | A load of less than 70mA was detected when FS Ret (FWS C24) circuit was energized. | Disconnect a wire from FS Ret (FWS C24) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WS option only |
| 128 | SHORTED CIRCUIT FS RET (FWS C24) | Excessive load was detected when FS Ret (FWS C24) circuit was energized. | Use a piece of wire to short the FS Ret (FWS C24) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WS option only |
| 129 | OPEN CIRCUIT FS EXT (FWS C25) | A load of less than 70mA was detected when FS Ext (FWS C25) circuit was energized. | Disconnect a wire from FS Ext (FWS C25) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WS option only |
| 130 | SHORTED CIRCUIT FS RET (FWS C25) | Excessive load was detected when FS Ext (FWS C25) circuit was energized. | Use a piece of wire to short the FS Ext (FWS C25) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WS option only |
| 131 | OPEN CIRCUIT DC D FWD (FWS C26) | A load of less than 70mA was detected when DC D Fwd (FWS C26) circuit was energized. | Disconnect a wire from DC D Fwd (FWS C26) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WS option only |
| 132 | SHORTED CIRCUIT DC D FWD (FWS C26) | Excessive load was detected when DC D Fwd (FWS C26) circuit was energized. | Use a piece of wire to short the DC D Fwd (FWS C26) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WS option only |
| 133 | OPEN CIRCUIT DC D REV (FWS C27) | A load of less than 70mA was detected when DC D Rev (FWS C27) circuit was energized. | Disconnect a wire from DC D Rev (FWS C27) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WS option only |
| 134 | SHORTED CIRCUIT DC D REV (FWS C27) | Excessive load was detected when DC D Rev (FWS C27) circuit was energized. | Use a piece of wire to short the DC D Rev (FWS C27) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WS option only |
| 135 | OPEN CIRCUIT DC D (FWS C28) | A load of less than 70mA was detected when DC D (FWS C28) circuit was energized. | Disconnect a wire from DC D (FWS C28) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WS option only |

| Error code | Error message | Error definition | To simulate error | To clear error | Comments |
|---|---|---|---|---|---|
| 136 | SHORTED CIRCUIT DC D (FWS C28) | Excessive load was detected when DC D (FWS C28) circuit was energized. | Use a piece of wire to short the DC D (FWS C28) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WS option only |
| 137 | OPEN CIRCUIT DC D (FWS C29) | A load of less than 70mA was detected when DC D (FWS C29) circuit was energized. | Disconnect a wire from DC D (FWS C29) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WS option only |
| 138 | SHORTED CIRCUIT DC D (FWS C29) | Excessive load was detected when DC D (FWS C29) circuit was energized. | Use a piece of wire to short the DC D (FWS C29) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WS option only |
| 139 | OPEN CIRCUIT DC D (FWS C30) | A load of less than 70mA was detected when DC D (FWS C30) circuit was energized. | Disconnect a wire from DC D (FWS C30) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WS option only |
| 140 | SHORTED CIRCUIT DC D (FWS C30) | Excessive load was detected when DC D (FWS C30) circuit was energized. | Use a piece of wire to short the DC D (FWS C30) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WS option only |
| 141 | OPEN CIRCUIT DC D (FWS C31) | A load of less than 70mA was detected when DC D (FWS C31) circuit was energized. | Disconnect a wire from DC D (FWS C31) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WS option only |
| 142 | SHORTED CIRCUIT DC D (FWS C31) | Excessive load was detected when DC D (FWS C31) circuit was energized. | Use a piece of wire to short the DC D (FWS C31) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WS option only |
| 143 | OPEN CIRCUIT (FWS C32) | A load of less than 70mA was detected when (FWS C32) circuit was energized. | Disconnect a wire from (FWS C32) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WS option only |
| 144 | SHORTED CIRCUIT (FWS C32) | Excessive load was detected when (FWS C32) circuit was energized. | Use a piece of wire to short the (FWS C32) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WS option only |
| 145 | OPEN CIRCUIT (FWS C33) | A load of less than 70mA was detected when (FWS C33) circuit was energized. | Disconnect a wire from (FWS C33) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WS option only |
| 146 | SHORTED CIRCUIT (FWS C33) | Excessive load was detected when (FWS C33) circuit was energized. | Use a piece of wire to short the (FWS C33) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WS option only |
| 147 | OPEN CIRCUIT (FWS C34) | A load of less than 70mA was detected when (FWS C34) circuit was energized. | Disconnect a wire from (FWS C34) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WS option only |

# E-Trouble shooting and diagram

| Error code | Error message | Error definition | To simulate error | To clear error | Comments |
|---|---|---|---|---|---|
| 148 | SHORTED CIRCUIT (FWS C34) | Excessive load was detected when (FWS C34) circuit was energized. | Use a piece of wire to short the (FWS C34) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WS option only |
| 149 | OPEN CIRCUIT (FWS R2) | A load of less than 70mA was detected when (FWS R2) circuit was energized. | Disconnect a wire from (FWS R2) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WS option only |
| 150 | SHORTED CIRCUIT (FWS R2) | Excessive load was detected when (FWS R2) circuit was energized. | Use a piece of wire to short the (FWS R2) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WS option only |
| 151 | OPEN CIRCUIT (FWS GEN G1) | A load of less than 70mA was detected when (FWS Gen G1) circuit was energized. | Disconnect a wire from (FWS Gen G1) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WS option only |
| 152 | SHORTED CIRCUIT (FWS GEN G1) | Excessive load was detected when (FWS Gen G1) circuit was energized. | Use a piece of wire to short the (FWS Gen G1) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WS option only |
| 153 | OPEN CIRCUIT (FWS CON 24V) | A load of less than 70mA was detected when (FWS Con 24V) circuit was energized. | Disconnect a wire from (FWS Con 24V) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WS option only |
| 154 | SHORTED CIRCUIT (FWS CON 24V) | Excessive load was detected when (FWS Con 24V) circuit was energized. | Use a piece of wire to short the (FWS Con 24V) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WS option only |
| 155 | OPEN CIRCUIT (FWS SPARE 1) | A load of less than 70mA was detected when (FWS Spare 1) circuit was energized. | Disconnect a wire from (FWS Spare 1) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WS option only |
| 156 | SHORTED CIRCUIT (FWS SPARE 1) | Excessive load was detected when (FWS Spare 1) circuit was energized. | Use a piece of wire to short the (FWS Spare 1) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WS option only |
| 157 | OPEN CIRCUIT (FWS SPARE 2) | A load of less than 70mA was detected when (FWS Spare 2) circuit was energized. | Disconnect a wire from (FWS Spare 2) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WS option only |
| 158 | SHORTED CIRCUIT (FWS SPARE 2) | Excessive load was detected when (FWS Spare 2) circuit was energized. | Use a piece of wire to short the (FWS Spare 2) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WS option only |
| 159 | OPEN CIRCUIT (FWS SPARE 3) | A load of less than 70mA was detected when (FWS Spare 3) circuit was energized. | Disconnect a wire from (FWS Spare 3) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WS option only |

# E-Trouble shooting and diagram

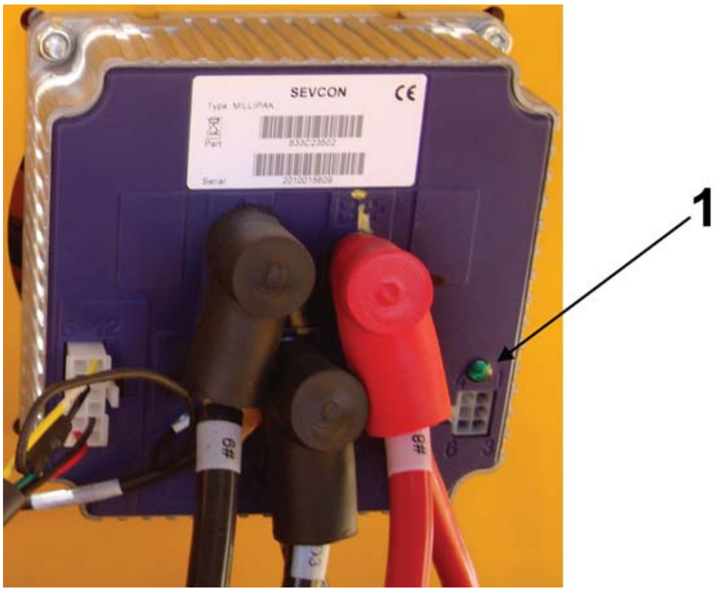
| Error code | Error message | Error definition | To simulate error | To clear error | Comments |
|---|---|---|---|---|---|
| 160 | SHORTED CIRCUIT (FWS SPARE 3) | Excessive load was detected when (FWS Spare 3) circuit was energized. | Use a piece of wire to short the (FWS Spare 3) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WS option only |
| 161 | OPEN CIRCUIT (FWS PROP A1) | A load of less than 70mA was detected when (FWS Prop A1) circuit was energized. | Disconnect a wire from (FWS Prop A1) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WS option only |
| 162 | SHORTED CIRCUIT (FWS PROP A1) | Excessive load was detected when (FWS Prop A1) circuit was energized. | Use a piece of wire to short the (FWS Prop A1) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WS option only |
| 163 | OPEN CIRCUIT (FWS PROP A2) | A load of less than 70mA was detected when (FWS Prop A2) circuit was energized. | Disconnect a wire from (FWS Prop A2) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WS option only |
| 164 | SHORTED CIRCUIT (FWS PROP A2) | Excessive load was detected when (FWS Prop A2) circuit was energized. | Use a piece of wire to short the (FWS Prop A2) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WS option only |
| 165 | OPEN CIRCUIT (FWS PROP B1) | A load of less than 70mA was detected when (FWS Prop B1) circuit was energized. | Disconnect a wire from (FWS Prop B1) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WS option only |
| 166 | SHORTED CIRCUIT (FWS PROP B1) | Excessive load was detected when (FWS Prop B1) circuit was energized. | Use a piece of wire to short the (FWS Prop B1) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WS option only |
| 167 | OPEN CIRCUIT (FWS PROP B2) | A load of less than 70mA was detected when (FWS Prop B2) circuit was energized. | Disconnect a wire from (FWS Prop B2) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WS option only |
| 168 | SHORTED CIRCUIT (FWS PROP B2) | Excessive load was detected when (FWS Prop B2) circuit was energized. | Use a piece of wire to short the (FWS Prop B2) coil. | This is a latched error. Power must be cycled to clear error. | Checked only at power up Machines with 4WS option only |

## 1.2 - Error code definitions - Motor controller

The Motor Controller indicates the operational status of the controller, it is located under the power compartment cover (left / drivers side), and behind the ground (lower) control box. If an error condition is detected, the appropriate error code will be displayed by a flashing indicator light ( 1 ).

Refer to this table to resolve the Fault or contact HAULOTTE® Customer Service Department at 1-800-537-0540 or visit HAULOTTE® online at www.haulotte-usa.com with any questions.

**Motor controller**




**Error code definitions - Motor controller**

| Flash fault | Priority ID | Fault | Description | Solution |
|---|---|---|---|---|
| Steady ON, no flashing | 1 | None | System is operating normally. | None required. |
| 1 | 11 | Configuration Range Error | One or more controller personality settings are out of range. | Use Sevcon calibrator to enter correct settings from latest Personality Sheet. |
| 1 | 12 | CRC Error | The controller personality checksum is incorrect. | Use Sevcon calibrator to enter correct settings from latest Personality Sheet. Otherwise, replace motor controller. |
| 2 | 5 | Sequence Fault | Enable line is active at power up. | Check enable line, B- wiring, and Molex connector. |
| 2 | 6 | Accelerator Fault | Invalid accelerator personality setting. | Check speed input line, B- wiring, Molex connector, and 1000 ohm resistor. |
| 3 | 17 | MOSFET Short Circuit | MOSFET short circuit or controller miswire detected. | Check for miswired B+, B-, or pump cables. Make sure pump terminals are not shorted to frame. If cables and pump are OK, then replace motor controller. |
| 4 | 14 | Line Contactor Welded | The line contactor is welded or otherwise shorted | Check line contactor wiring. If wiring is OK, then replace line contactor. |
| 4 | 15 | Line Contactor did not Close | Line contactor did not close or is otherwise open circuit. | Check line contactor wiring and Molex connector. Measure the contactor coil resistance; it should be around 50 ohms. If contactor and wiring are OK, then replace motor controller. |

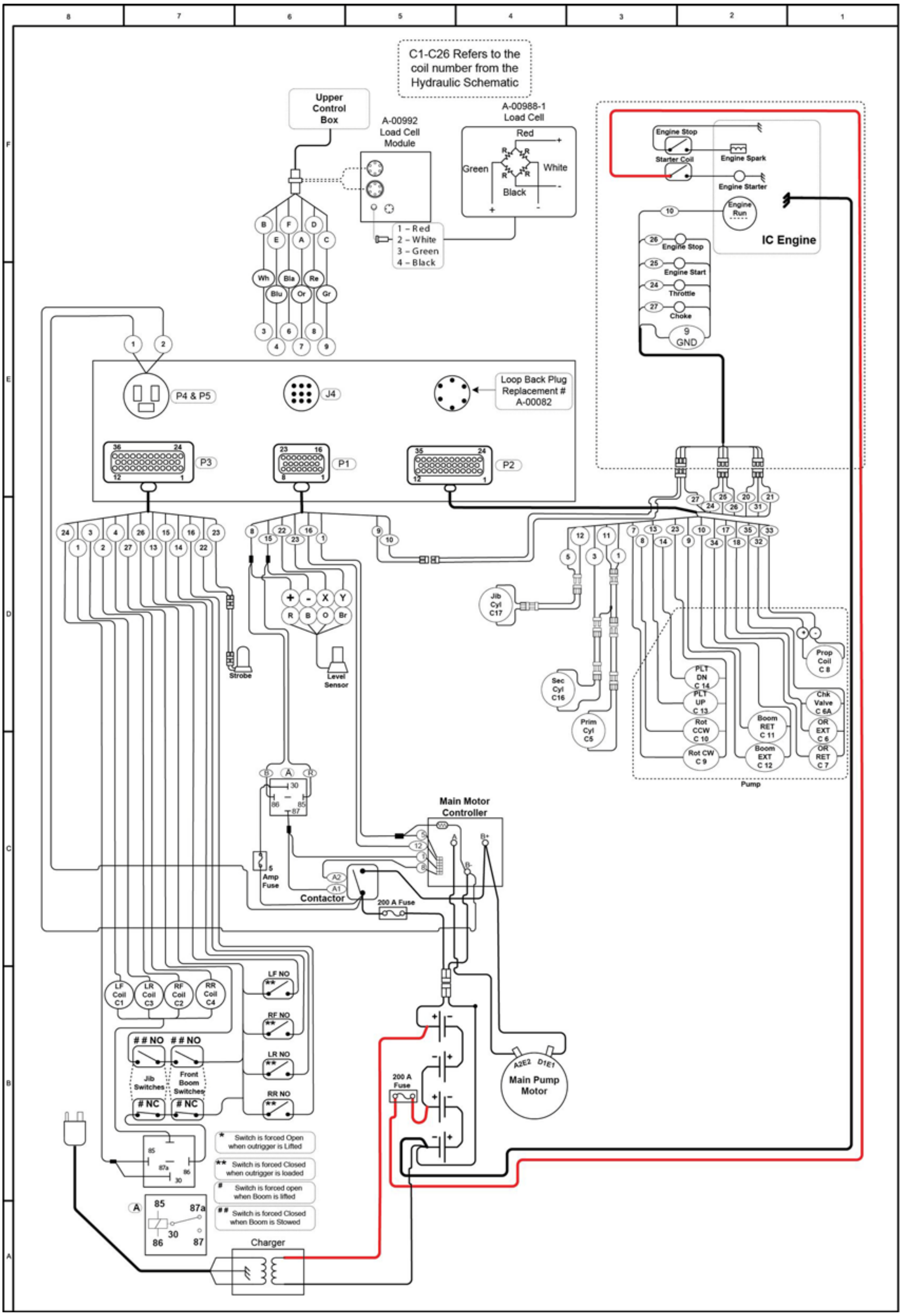
# E-Trouble shooting and diagram

| Flash fault | Priority ID | Fault | Description | Solution |
|---|---|---|---|---|
| 5 | 16 | Motor open circuit | Pump motor cable disconnected. | Check pump-motor and controller cables. Measure pump motor resistance it should be near zero ohms. |
| 6 | N/A | Not used in this application | N/A | N/A |
| 7 | 7 | Low Battery | Battery voltage is too low. | Recharge the batteries. Look for shorted battery cells. Make sure one or more batteries are not reversed. |
| 7 | 8 | High battery | Battery voltage is too high. | Make sure battery charger is off. Check for poor or corroded battery connections. |
| 7 | 10 | High Battery with Line Contactor Open | High battery voltage was detected at power up before line contactor closed. | Make sure battery charger is off or that the battery is not overcharged. |
| 8 | 1 | Thermal Cutback | Maximum power available to motor has been reduced due to excessive heat sink temperature. | Remove power and allow controller to cool. If fault repeatedly occurs, look for binding on the hydraulic cylinders or sticking valves. Otherwise, the pump motor may be failing. |
| 8 | 3 | Pump IIT Current Limit Cutback | Maximum power available to pump motor has been reduced by the Current Limit Cutback function. | Recycle power. If fault repeatedly occurs, look for binding on the hydraulic cylinders or sticking valves. Otherwise, the pump motor may be failing. |
| 9 | N/A | Not used in this application | N/A | N/A |
| 10 | N/A | Not used in this application | N/A | N/A |
| 11 | 18 | Auto Zero Out of Range | Internal pump current measurement circuit could not be calibrated. | Replace motor controller. |
| 11 | 24 | System Monitor | Illegal system condition sensed due to internal hardware fault. | Replace motor controller. |
| Single flash, then off | 19 | MOSFETs Off | MOSFETs did not pulse when the internal failsafe circuit was enabled. | Check for reversed cables among B+, B-, and A terminals. If no miswire is found, replace motor controller. |
| Single flash, then off | 20 | MOSFETs On | MOSFETs pulsed while the internal failsafe circuit was disabled. | Check for reversed cables among B+, B-, and A terminals. If no miswire is found, replace motor controller. |
| Single flash, then off | 22 | Contactor Drive Off | Contactor output did not pulse with the internal failsafe circuit enabled. | Replace motor controller. |
| Single flash, then off | 23 | Contactor Drive On | Contactor output pulsed while the internal failsafe circuit was disabled. | Replace motor controller. |

## 2 - Electric diagram

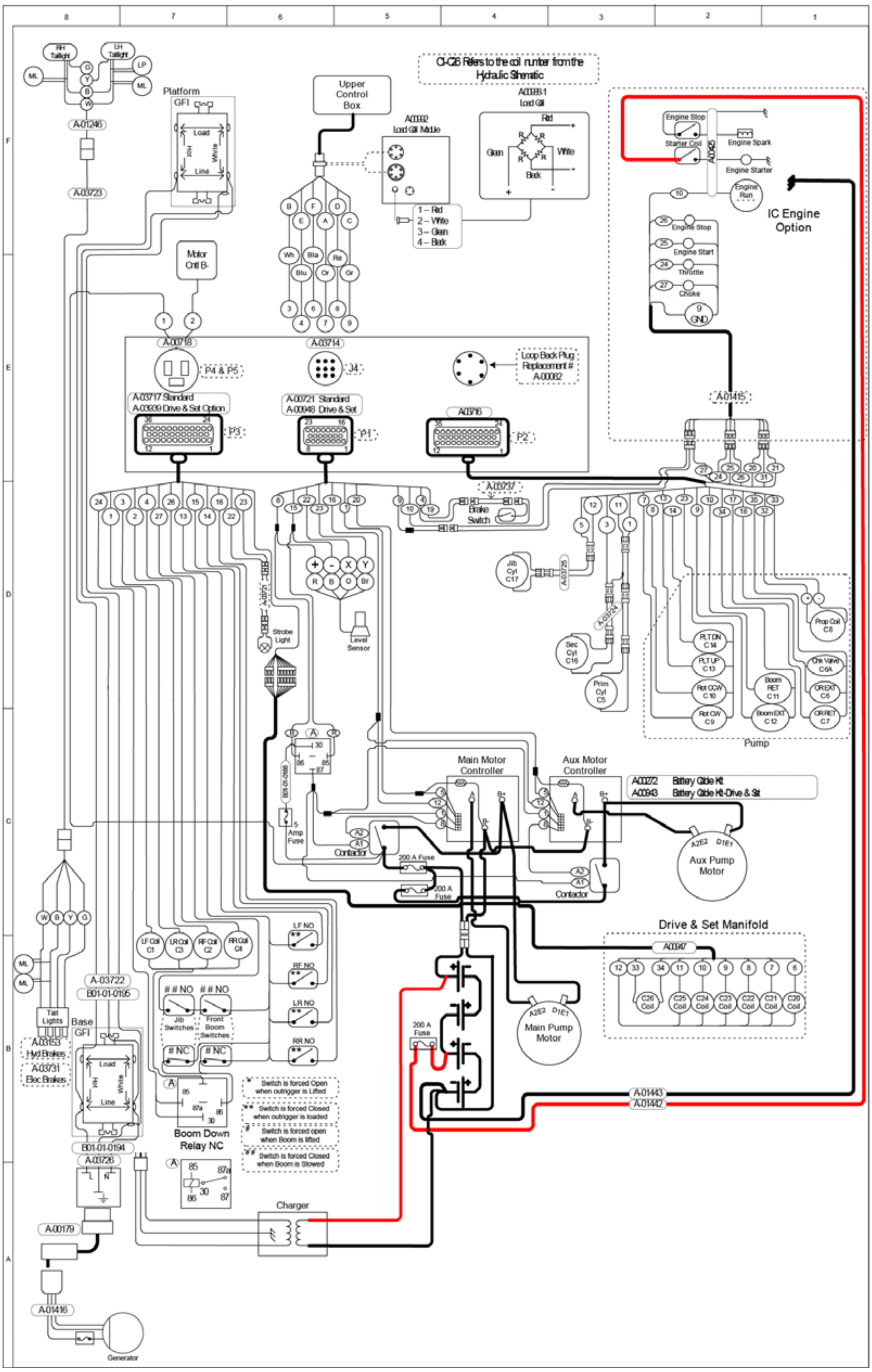
### ANSI standard-3522A - HTA13P

**B33-02-0074A - Page 1 on 2**



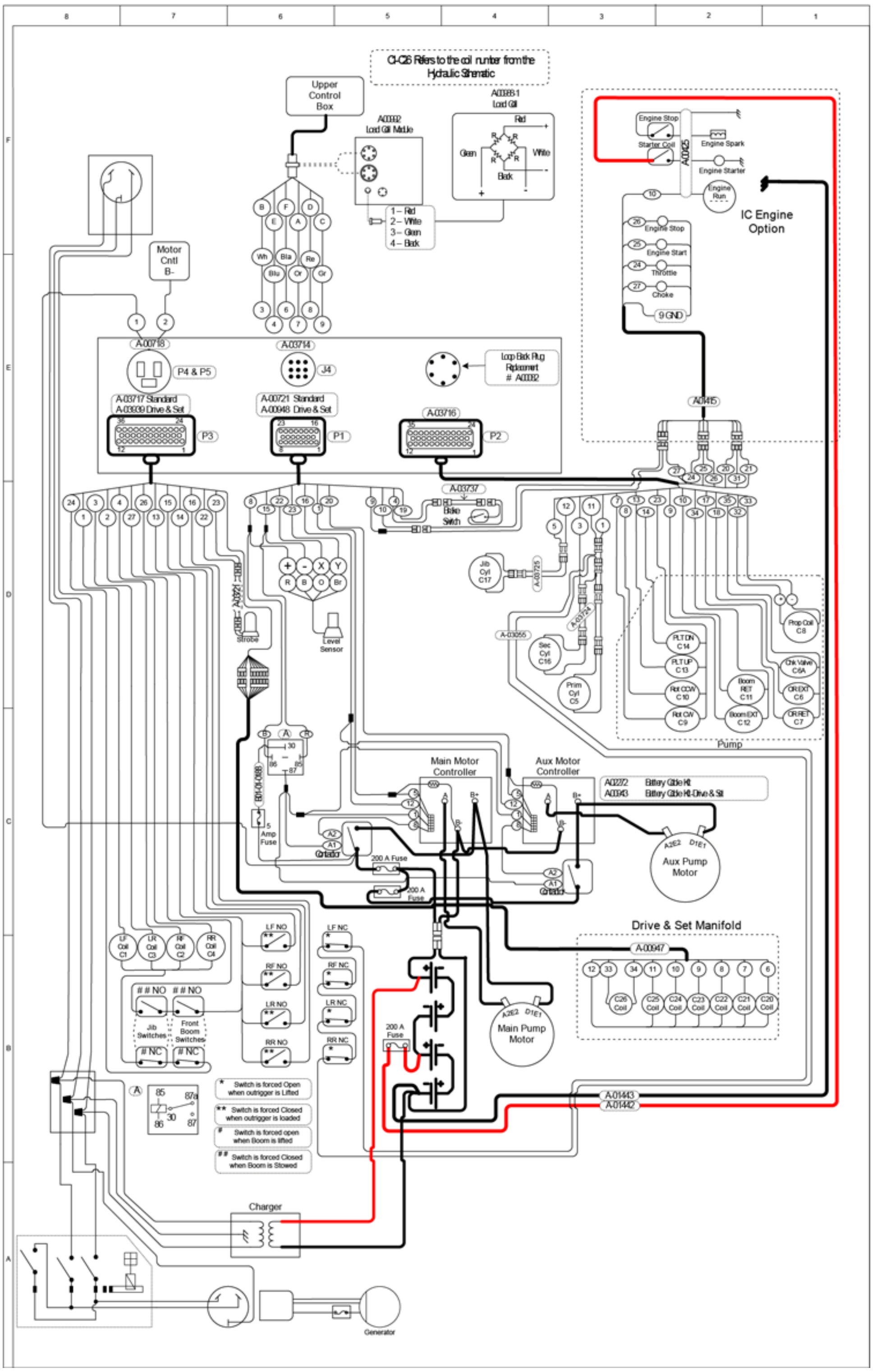
**ANSI standard-4527A - HTA16P**

**B33-02-0076A - Page 1 on 3**



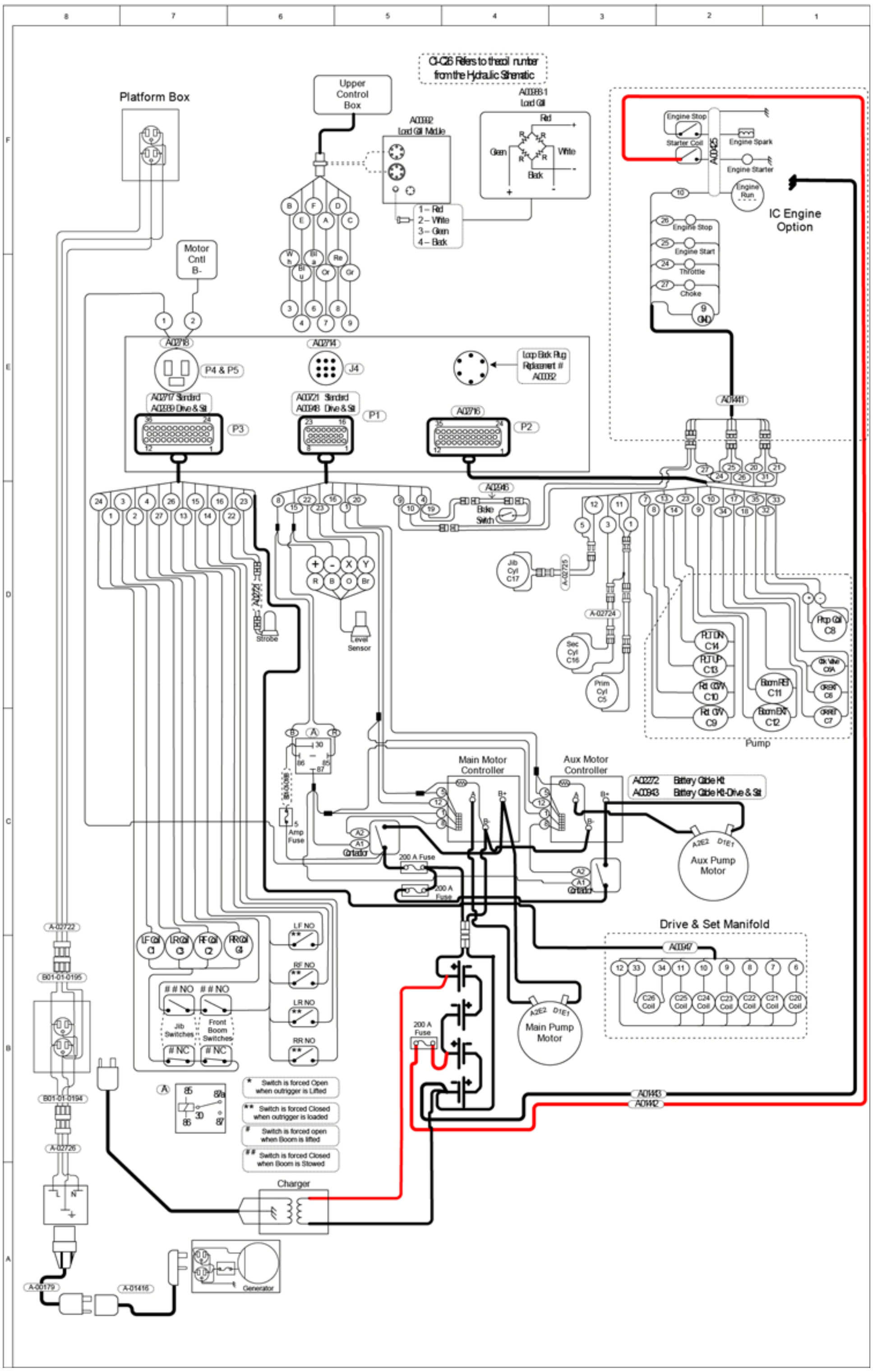
**AS standard-4527A - HTA16P**

**B33-02-0076A - Page 3 on 3**



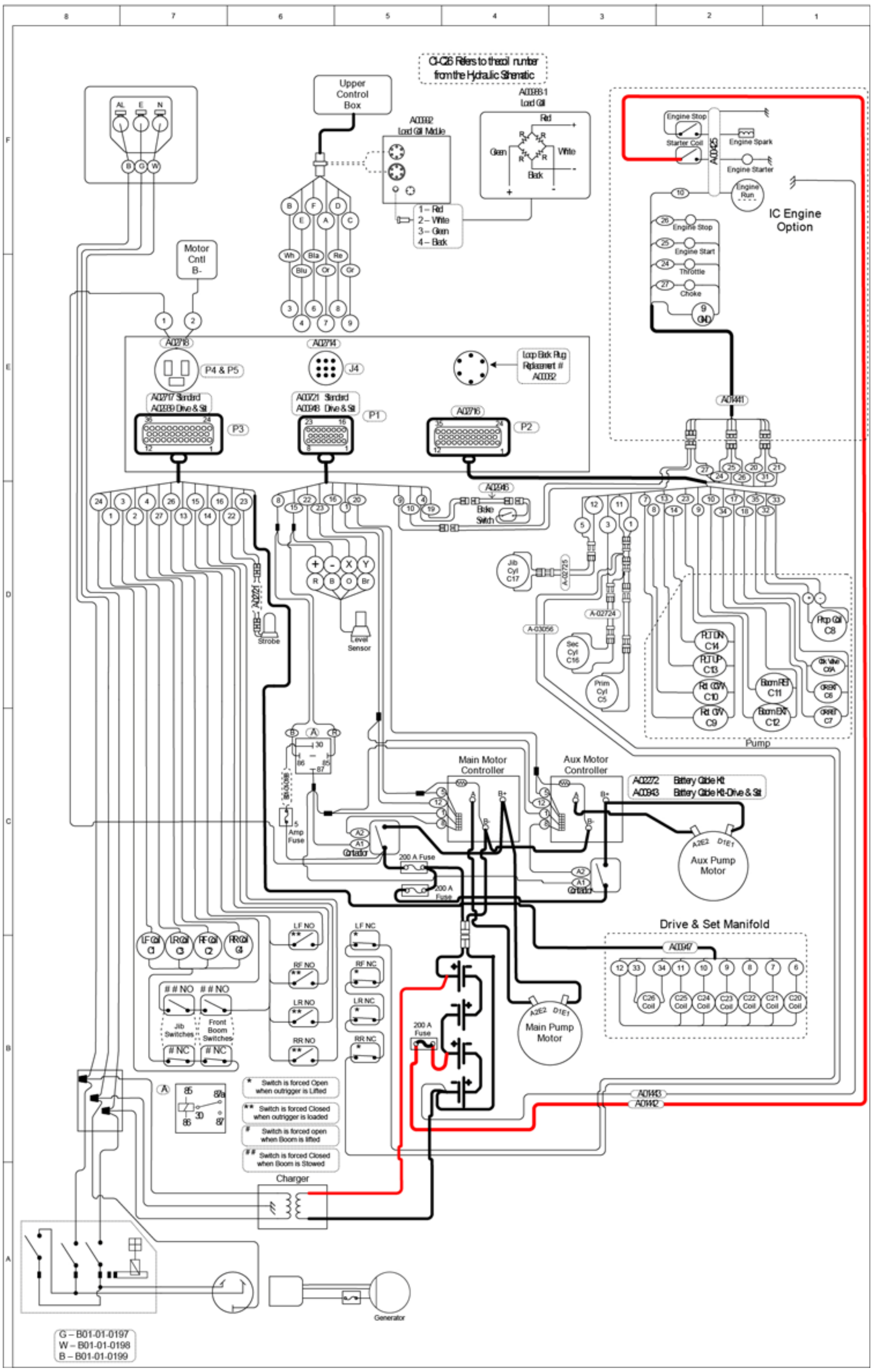
### ANSI standard-5533A - HTA19P

**B33-02-0078A - Page 1 on 3**



**AS standard-5533A - HTA19P**

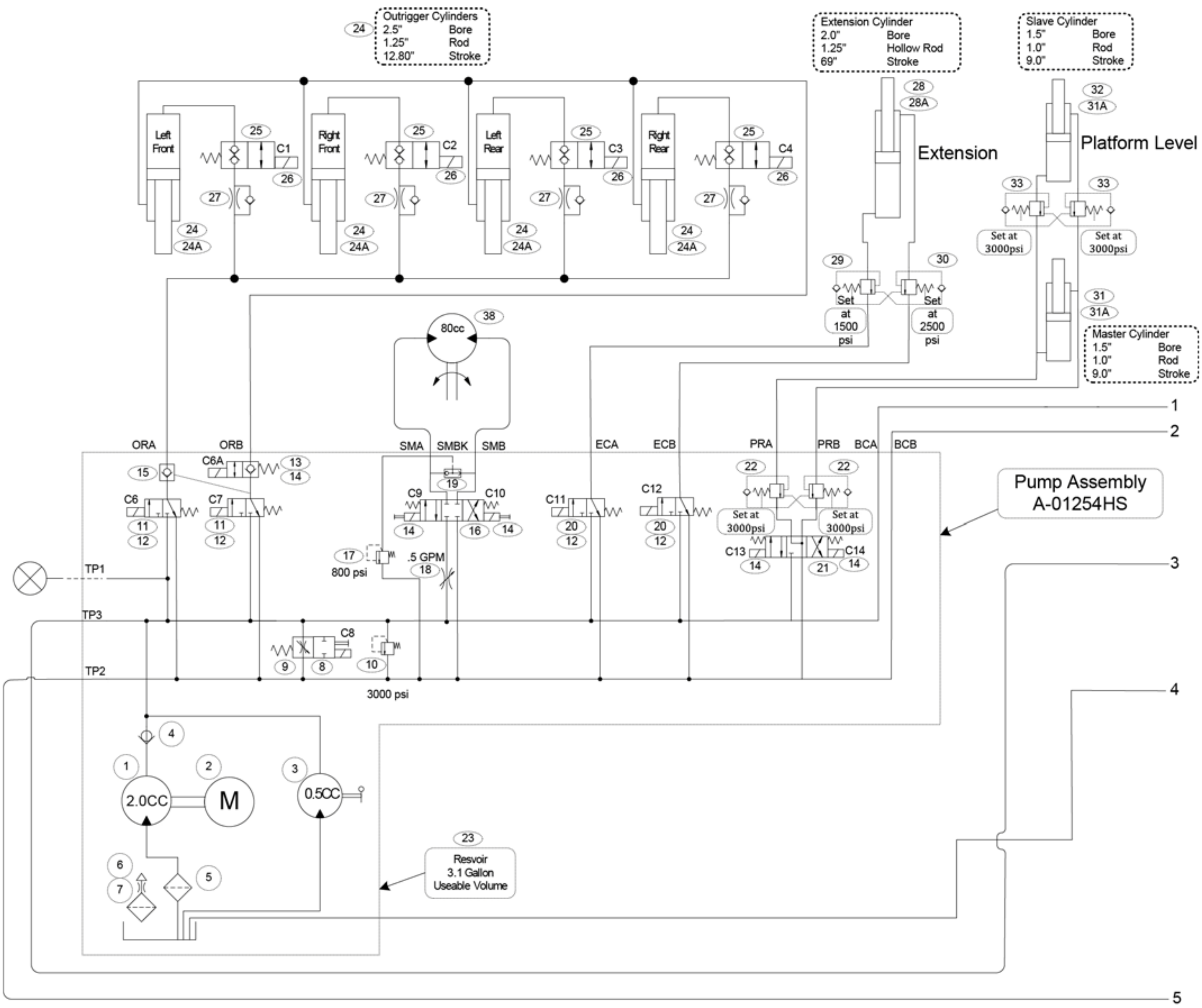
**B33-02-0078A - Page 3 on 3**



# Notes

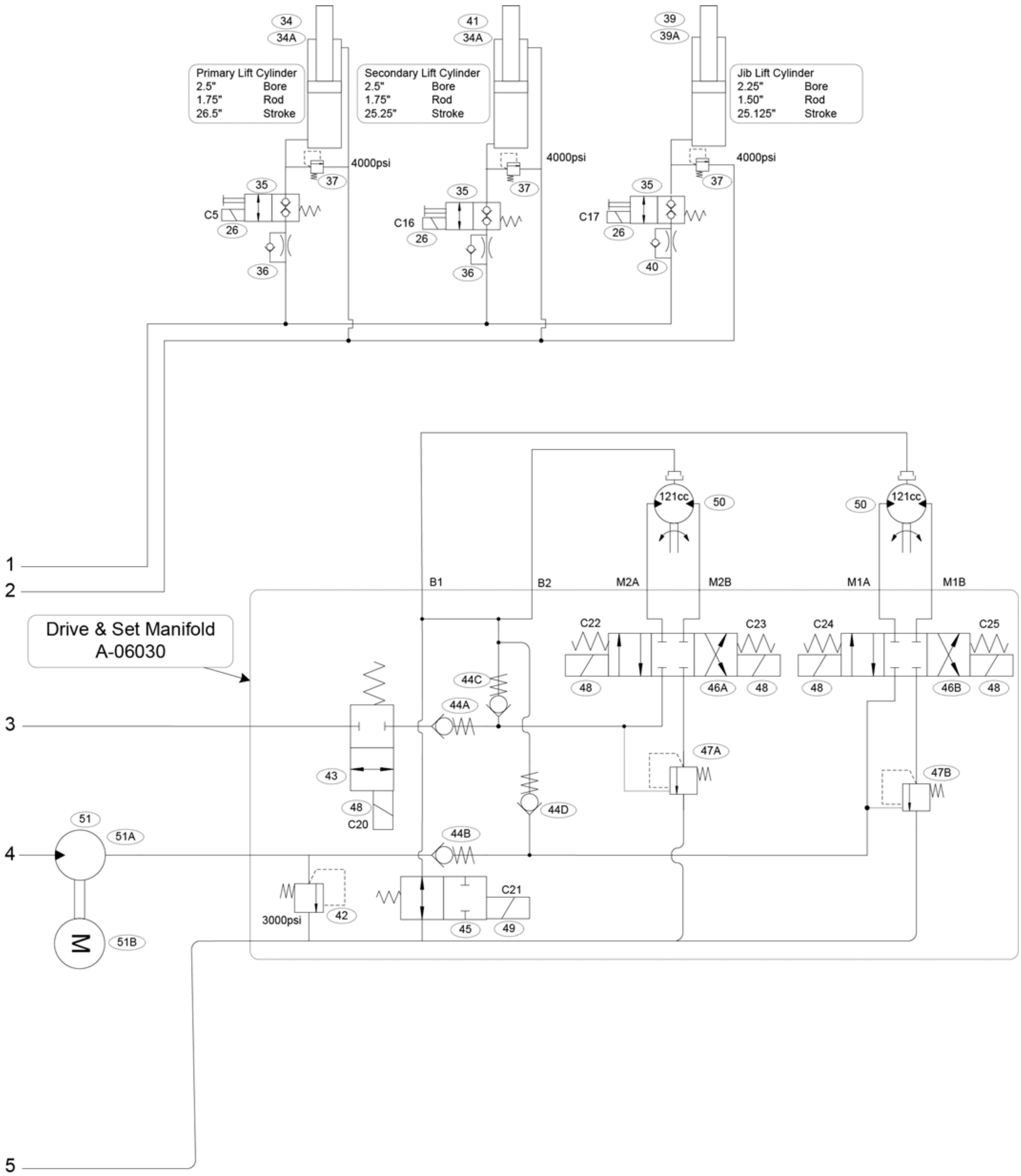
## 3 - Hydraulic diagram

**3522A - HTA13P - B33-02-0073A - Page 1 on 2**

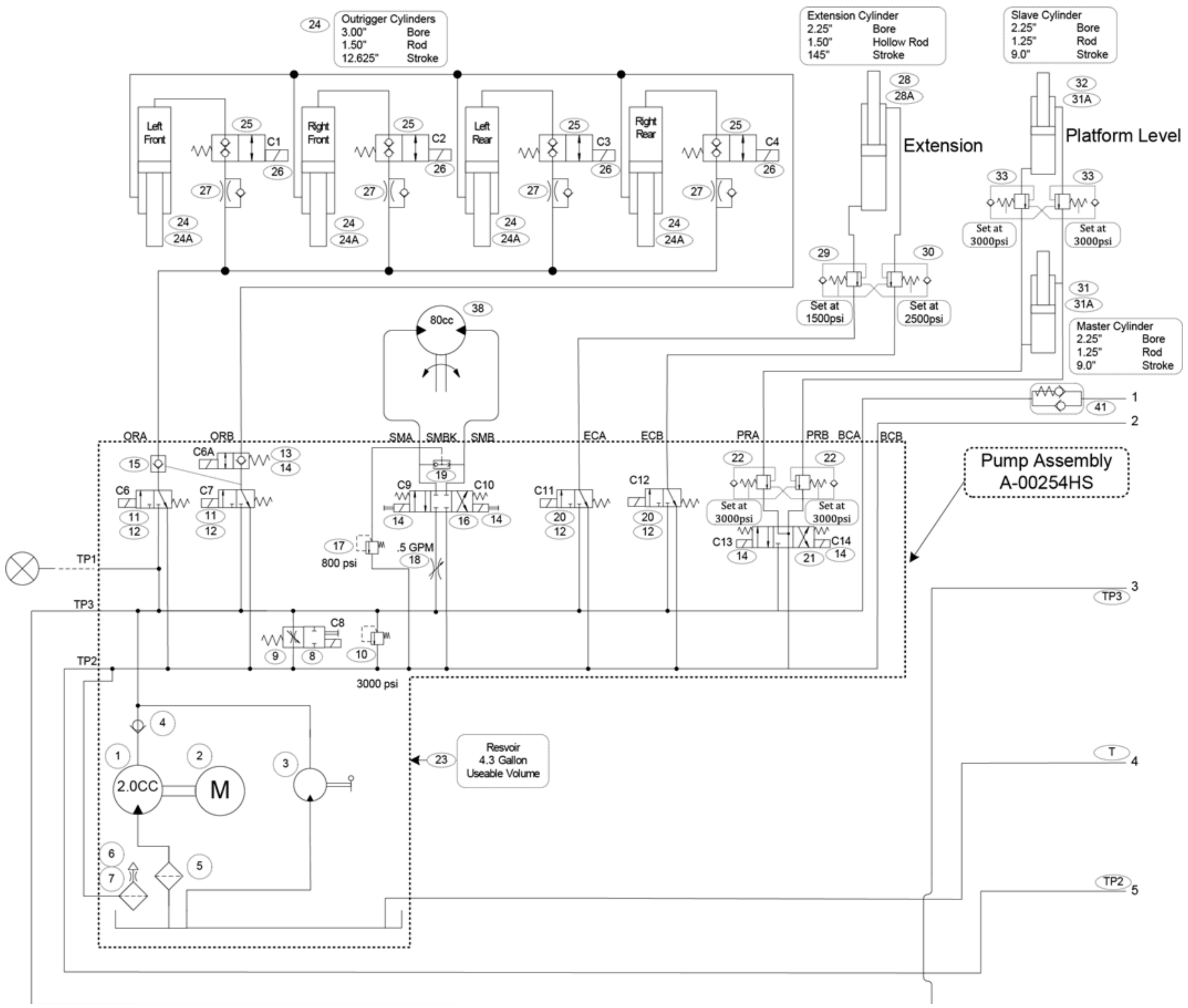


# E-Trouble shooting and diagram

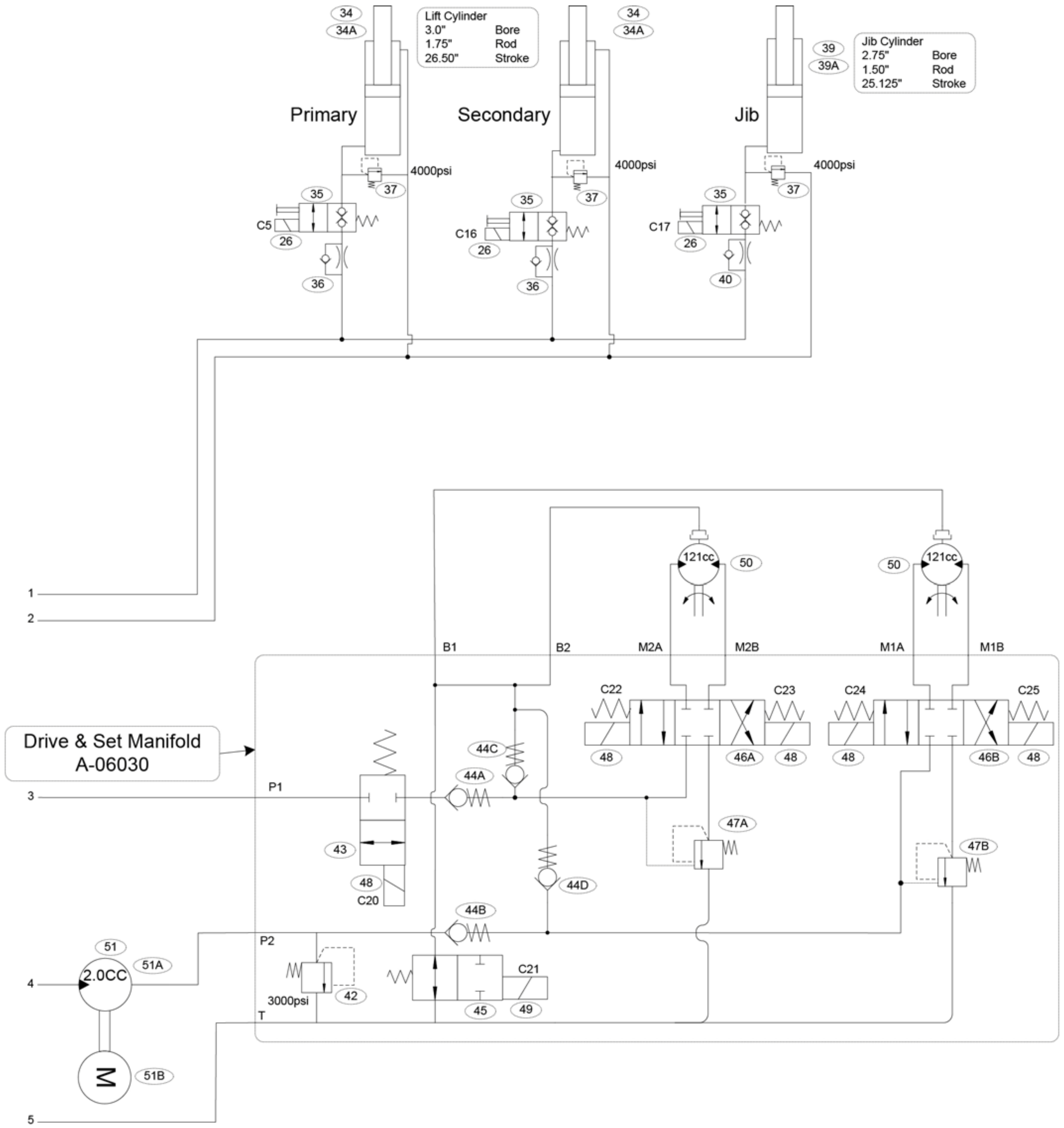
**3522A - HTA13P - B33-02-0073A - Page 2 on 2**



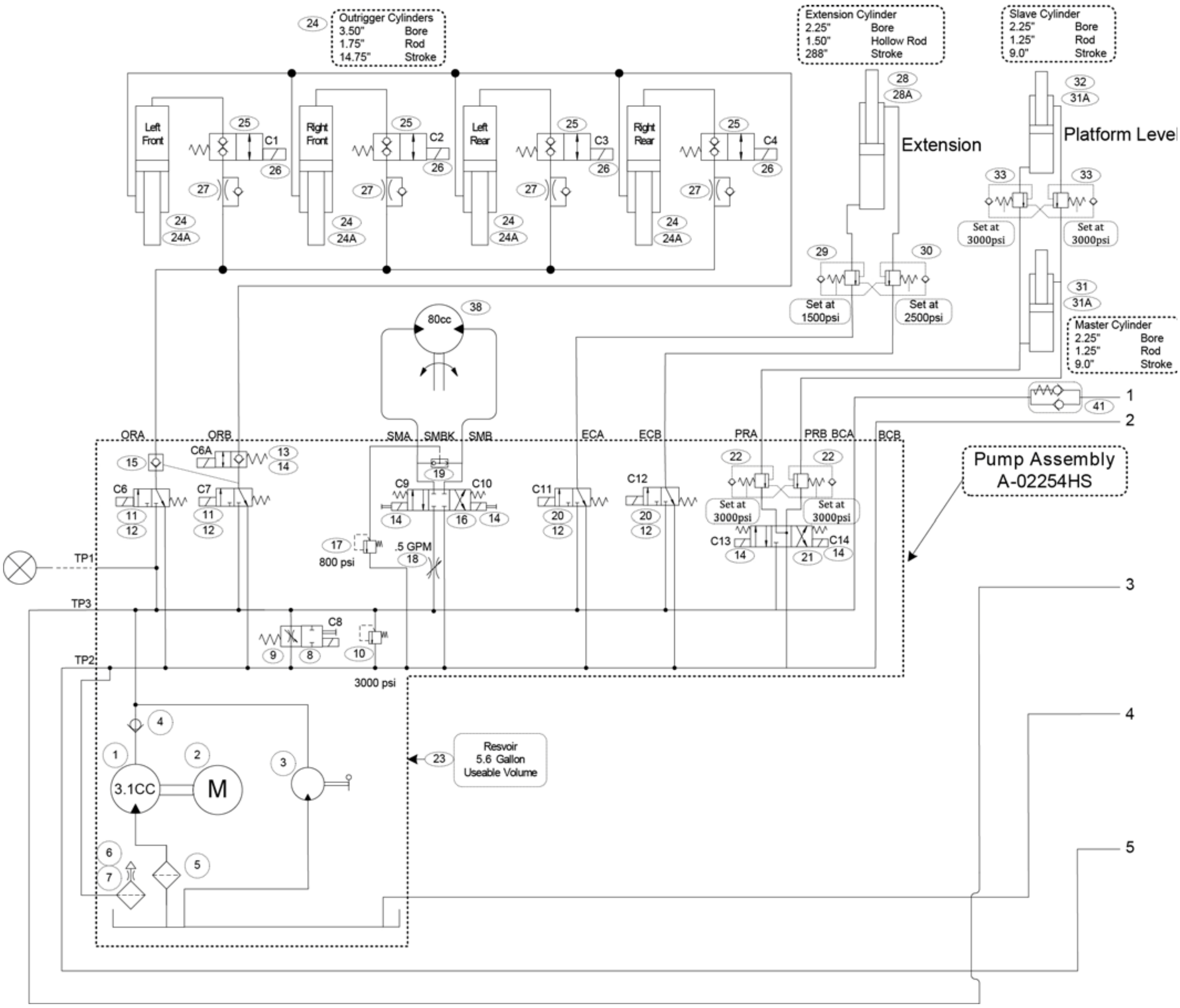
**4527A - HTA16P - B33-02-0075A - Page 1 on 2**



**4527A - HTA16P - B33-02-0075A - Page 2 on 2**

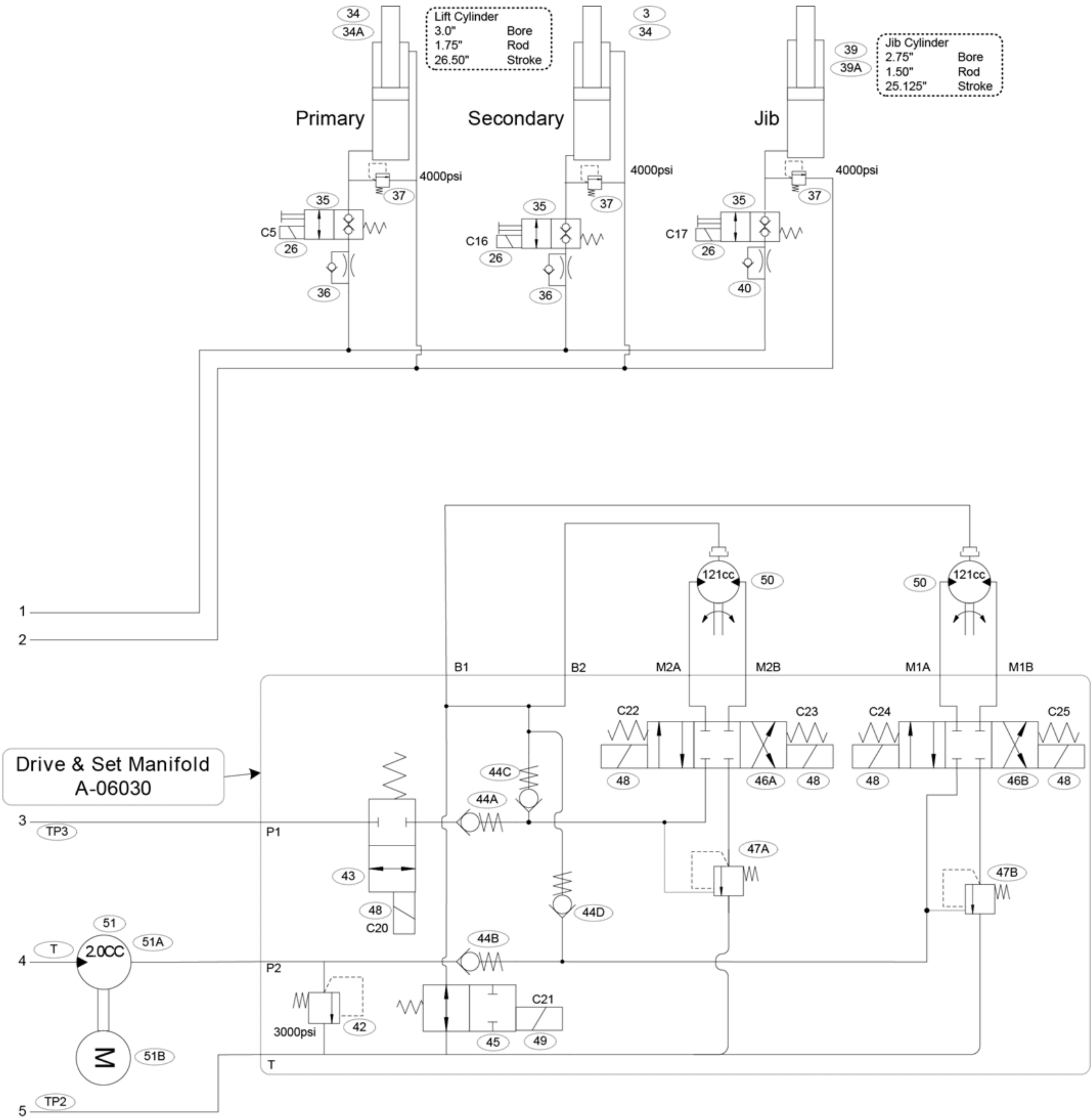


**5533A - HTA19P - B33-02-0077A - Page 1 on 2**



# E-Trouble shooting and diagram

**5533A - HTA19P - B33-02-0077A - Page 2 on 2**



# Notes

# 1 - Inspection Form

**Inspection Form for Haulotte Aerial Work Platforms**

| Machine Model No. | | Serial No. | |
|---|---|---|---|
| Date of Manufacture : | | Inspection Performed by : | |
| Date of inspection : | | Inspection Location : | |
| Inspection and Maintenance of the above listed machine shall be performed only by fully trained, authorized and, where applicable, certified personnel. All service checks shall be performed in accordance with manufacturer's recommendations (Refer to the Maintenance section of this manual). Copy this form as needed. Direct any questions to the HAULOTTE® Customer Service Department at 1-800-537-0540 or visit HAULOTTE® online at www.haulotte-usa.com. | | | |
| Inspector : Initial in the space provided beside each service check as it is completed. Sign and date form after Inspection.<br>Owner : Keep this form for your records. | | | |
| Frequency key : | | | |
| D = Daily (or before each use); W = Weekly; M = Monthly; A = Annually; SA = Semi-Annually | | | |
| Service check descriptions | | Frequency | Initials |
| Verify that all decals are legible, correctly applied, and in plain view. | | D | |
| Verify that all controls and indicators at the ground (lower) and platform (upper) control stations operate properly. | | D | |
| Verify operation of running and brake lights. | | D | |
| Verify proper tire inflation. See the side wall of the tire for proper inflation. | | D | |
| Inspect tires for damage or loose or missing lug nuts. | | D | |
| Inspect structural components for obvious damage or debris. | | D | |
| Inspect machine for loose, damaged or missing fasteners, including pins and bolts. | | D | |
| Verify that the boom down limit switches operate correctly. | | D | |
| Verify that outrigger safety interlocks operate correctly. | | D | |
| Inspect hydraulic system and fluid levels. | | D | |
| Check Battery electrolyte level. | | W | |
| Inspect electrical wiring for damaged, broken or frayed wires. | | W | |
| Inspect transport hitch for damage ; if fitted. | | W | |
| Inspect boom for missing, loose or damaged hardware. | | W | |
| Inspect all hydraulic system components including power unit, hoses and cylinders, for damage, leaks, loss of pressure or speed, and unusual noise or vibration. | | W | |

# F-Inspection Form

| Machine Model No. | | Serial No. | |
|---|---|---|---|
| Check engine oil. Applicable for machines equipped with engines. | | W | |
| Clean all battery terminals. | | M | |
| Check battery connections. | | M | |
| Verify proper operation of manual lowering valves and hand pump. | | M | |
| Lubricate all compartment hinges and latches, slew ring and mating gear using NLGI Grade 2 multi-purpose grease. | | M | |
| Check wheel nut torque. | | M | |
| Check coolant level. Applicable for machines equipped with engines. | | M | |
| Inspect the air filter. Applicable for machines equipped with engines. | | M | |
| Verify proper level sensor operation(Use outriggers to tilt machine, try to operate boom functions. ). | | M | |
| Check drive belt tension. | | SA | |
| Verify engine rpm. Applicable for machines equipped with engines. | | SA | |
| Add or replace hydraulic oil and hydraulic filter annualy, replace more frequently in dirty conditions. | | A | |
| Inspect pivot pins and cylinders, including rod ends for wear or damage. | | A | |
| Visually inspect all welds for wear, damage or corrosion. | | A | |
| Inspect outriggers for wear or damage. | | A | |
| Inspect axle and parking brake, adjust as necessary. | | A | |
| Load test all boom functions with a 227 Kg (500 lb) load (200 Kg (440 lb) load if machine is equipped with jib/platform rotate). | | A | |
| Check slew ring for wear or damage. | | A | |
| Replace Jib Bushings. | | A | |
| ** Refer to engine operators manual for recommended engine maintenance. | | | |
| Inspector signature | | Date | |